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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

Notes on soil acidity, the first fruits of the studies of Mr. H. W. Kerr since his appointment as a travelling sugar research scholar, will be read with much interest. Mr. Legg, Government veterinary officer at Townsville, describes the Gilbert River Horse Disease; while Mr. Shelton, in addition to his regular pig-breeding notes, gives an interesting account of the opening of the new bacon factory at Atherton. Wattle bark and the possibilities of its cultivation in Queensland are discussed by Mr. White. Illustrations of the recent successful field day at Bundaberg add interest to this month's sugar notes. Other informative features increase the value of a useful June Journal.

Gatton College.

The reorganisation of the Gatton Agricultural High School and College has been pursued uninterruptedly. The syllabus of instruction has been revised, the scope of practical operations extended with suitable adaptation to local conditions and possibilities, necessary alterations and equipment executed at considerable expense, and specially qualified instructors appointed to the staff. Students not only attend lectures, but half their working time is devoted to field practice in every branch of agriculture. Experiments figure largely in the educational programme, and in these experiments local products, local interests and possibilities, and local physical conditions of climate and soil are given full consideration.

Fodder Conservation.

Part of the college curriculum embraces a close study of agricultural economics. Bountiful rains in the Lockyer Valley early this year were followed by an abundant growth of natural grasses. The value of our natural grasses is not appreciated as widely as it should be. The College authorities, however, were not slow in seizing the opportunity seasonal conditions offered of demonstrating the economical advantage of stack storage of bush hay. In addition, fodder crops from the College farm lands were converted into silage. Altogether, 700 tons of fodder have been stored, sufficient to carry over fifty milkers for at least two years.

Scientific Feeding.

At the College particular attention is being bestowed upon the scientific feeding of cattle. A test, which extended over several months, has shown that cotton-seed meal as a food for cattle is of equal value to linseed meal, and that cattle eat the meal readily. When the respective approximate prices of cotton-seed meal (£7 per ton) and of linseed meal (say, £12 per ton) are compared, it is at once apparent that the results of the test are full of interest to those engaged in dairying and cotton growing. College records show that by the adoption of strictly scientific feeding the milk yield of the College cows has been increased by 35 per cent. without any increase in the cost of feed supplied. The economic aspects of all branches of agriculture are consistently kept in view.

Winter Courses for Farmers.

The requirements of visiting students are provided for by special winter courses in modern agricultural practice. The first "school," for farmers and farmers' sons, embracing this idea will be the Tractor School commencing this month—the first of its kind to be instituted in the Commonwealth. The course will cover demonstration and instruction in the construction and operation of tractors, general principles of internal combustion engines, methods of effecting simple repairs, tractor-costing, and fuels. In addition, lectures will be delivered on soils, crop cultivation, fodder conservation, and dry farming. The treatment of every subject is designed to be well within the grasp of the average agriculturist. A general course of instruction for farmers is also being planned by the College authorities. In the Gatton College Queensland has an institution at which agricultural students may receive a theoretical and practical agricultural education equal to that offered in any other Australian State.

Queensland Agriculture on the Film.

An event worthy of much more public notice than it received was the recent exhibition of moving pictures at the Royal Geographical Society's rooms by the Department of Agriculture and Stock. A series of films showing Queensland rural industries have been prepared for exhibition in England, and at the invitation of the Minister for Agriculture and Stock, Mr. W. N. Gillies, a large gathering of people interested in agriculture and stock assembled to view a preliminary screening. The great wool and sugar industries were shown in every phase and operation. There could be no more commendable way of placing Queensland's opportunities before the prospective migrant. Associated with the Queensland pictures was one from America illustrating the boll weevil menace and the means employed to combat that pest. The uses of the film as an educational factor could not be demonstrated more effectively, and it is hoped that the exhibition will be regarded as but a prelude to the release of many more films of such an educative character. The film as an instructive and administrative auxiliary is firmly established in rural France, Italy, and America, and its value to the Queensland producer in the same way has been recognised readily.

Education in the Bush.

The need for better facilities for the higher education of bush children was discussed fully at the recent conference of the Country Women's Association at Toowoomba. The efforts of the Government to reach every child, even in the remotest districts, by correspondence tuition and otherwise were commended. The correspondence system is proving very satisfactory and country children may, and do, pass the scholarship examination under this form of tuition. The conference generally commended the efforts of the Education Department, and was of opinion that it would be difficult to improve on the rural schools which had demonstrated clearly their sound practical value. A vote of thanks was accorded to the Department for what it had done for the children of the bush.

ON SOIL ACIDITY.

By H. W. KERR, Sugar Soils Travelling Scholar.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following interesting report upon Soil Acidities from the recently appointed Sugar Research Scholar in Soil Physics and Chemistry. This is the first fruits of Mr. Kerr's studies since taking up the scholarship.

The subject of "Soil Acidity" has engaged the attention of numerous investigators, who have attacked the problem from many angles; moreover, the number of methods propounded for estimating this factor and interpretating the results obtained is scarce exceeded by the number of workers. This is not at all surprising when one considers the extreme complexity of the substance which we call soil—and the differences which exist even between soils of the same origin; the acidity itself may arise from diverse causes, and we are now led to investigate fully these several substances of an acid nature.

When it was first discovered that an application of lime to an acid soil was attended by beneficial results in crop growth, it was generally regarded that all soil acidity was injurious and that sufficient lime should be applied to neutralise the whole of this acidity. The idea was soon found to be untenable, and large applications of lime often proved harmful; on the contrary we now know that most crops make optimum growth in a soil possessing a slight degree of acidity. The question which then presents itself is: What are these conditions of acidity which are to be desired and what is the nature of the acid substances?

At Purdue Experiment Station, Indiana, the subject has been closely studied for twenty years, during which period 10,000 soil samples have been examined. As a result, the conclusion has been drawn that it is rather the nature of the acidity than the actual degree of acidity itself which is the important factor. In humid regions, the silica of the soil tends to combine with aluminium, iron, and manganese to form active acid—reacting silicates; acidity arising in this way is called "mineral acidity." Again, under certain conditions the organic matter of soils assumes an acid character, due to the formation of humic, ulmic, and other complex organic acids; this is referred to as the "organic acidity" of the soil. Where sufficient calcium and magnesium are present in the soil to combine with these organic acids, the soil remains neutral; however, as the salts so formed are soluble and readily removed by leaching, humid soils tend to become acid. The important deduction which has been drawn by these and other investigators is that "organic acidity" is not injurious to plants, but "mineral acidity" is found to be very harmful, allowing both the hydrogen ions and aluminium ions to develop in the soil moisture, each of which may be toxic to plant growth.

We should then have at our command suitable methods for the determination of each type of acidity. Such have been found in the Hopkins' method for the estimation of "mineral acidity," and for the evaluation of "total acidity" ("mineral plus organic") we may titrate soil extracts with calcium hydroxide or calcium carbonate solutions of known strength, or employ the method of Hutchinson and McLennan, or that of Jones. Hopkins treats the soil sample with a solution of a salt of a strong acid and a strong base, such as potassium nitrate, the mixture being agitated for three hours on the mechanical shaker. The filtered extract is then titrated against standard alkali solution and in this way a measure is obtained of the inorganic acid—silicates; it is held that under these conditions the organic acids do not react to any appreciable extent.

A method of estimation of "total acidity" which has found favour with many workers and which has been adopted by the Agricultural Chemist (Mr. Brünnich) for several years, is that due to Hutchinson and McLennan. These workers treat the soil sample with a solution of calcium bicarbonate, and finally estimate the amount of this salt taken up in neutralising the soil acids. This method is open to grave objections in many cases, and the procedure of Jones (who employs a solution of calcium acetate in the soil extraction) has now been adopted by the A.O.A.C. and was used by the writer in an investigation of the acidities of twelve soil samples chosen from some of the Queensland sugar-growing districts. The results of this work are tabulated on separate sheet, and are not without interest. All acidities are expressed as the equivalents, in cwt. of calcium carbonate per acre of soil, one foot deep. The variations in the "total acidity" are very marked and range from a slight negative value up to 121 cwt. A comparison is also made of results by the two methods discussed above. In many cases the values obtained are identical, whilst in others the discrepancies are marked and with no regularity in the differences. Soil No. 1622 is interesting in this respect, as one method points to an appreciable acidity, whilst the other indicates that the soil is in an alkaline condition. It is difficult to explain this discrepancy.

The "mineral acidities" also vary within wide limits—from zero to 69 cwt. per acre—and the importance of determining the nature of the acidity existing in a

soil is emphasised by a study of soils Nos. 2040-1-4 and 2076-7, which have, roughly speaking, identical "total acidities," but of this the "mineral acidity" is an extremely variable fraction.

An acidity test which is often performed in the field and laboratory is that of the reaction towards litmus paper of a moistened sample of the soil. The results of the test on this series are found in column 4 of the table. As we would expect, there is a rough relationship between the litmus paper reaction and the "mineral acidity." It is this latter acidity which is responsible for the greater proportion of the hydrogen ions in the soil moisture, and the test with litmus is essentially a measure of the hydrogen ion concentration in the soil. For this reason, the test is somewhat valuable, as it gives us, in a ready manner, an approximate estimate of the toxic mineral acids present. Of course, the organic acids will contribute some hydrogen ions, but their effect will become appreciable only when the degree of "organic acidity" is high.

It has been found, at Purdue Experiment Station, that the best method of ascertaining the necessity of a soil for lime is to use the formula $K = \frac{H^2}{J - H}$ where H = acidity as determined by Hopkins' method and J = acidity as shown by the Jones' estimation, or simply $K = \frac{(\text{mineral acidity})^2}{\text{organic acidity}}$. This was the only method which yielded consistent results on both light and dark soils; a K value of over 25 would indicate a lack of lime for lucerne, whilst K 100, or over, would indicate that all grain crops needed lime. In the last column of the table are found the values of K for this series; with 8 of the soils, K has a value less than unity, but the last two soils have values of K 307 and K 90 respectively. The value of K, which indicates lack of lime in soils producing sugar crops, has not been determined, but undoubtedly these two soils could be limed with beneficial results. The value of this method is demonstrated by the fact that Bundaberg sugar soils do not respond to liming, even where the total acidity value is very high, as exemplified by sample No. 1824. The value of K in this case is ·06, *i.e.*, the acidity is practically all organic in nature.

The toxicity of aluminium salts in soils has engaged the attention of several investigators. Results are somewhat conflicting, but it seems that some crops are very susceptible to aluminium ions, while others are more affected by hydrogen ions. The concentration of the latter in a soil may be reduced by lime treatment, but aluminium toxicity is best corrected by application of phosphates, which, presumably, remove the aluminium as insoluble phosphate. In soils of this nature additions of both lime and phosphate are found to give best results. Thus, with a corn crop, application of 4 tons of monocalcium phosphate per acre to the soil proves very beneficial, yielding far better results than when 4 tons of calcium carbonate were applied; but on another plot, where the soil received 4 tons calcium carbonate and 500 lb. monocalcium phosphate, the heaviest crop resulted.

It would be of interest to determine the effects of such treatment on a similar soil producing cane—to ascertain whether this crop is more susceptible to hydrogen ions or to aluminium salts. Such soils we have, as represented by the two Babinda soils at the bottom of the table. During the titration of the soil extracts (Hopkins' method), heavy precipitates of aluminium hydroxide were produced, indicating the presence of acid aluminium silicates. The writer would suggest that plot experiments be carried out on these soils, as they present an excellent opportunity of clearing up the problem suggested above, with respect to aluminium and hydrogen iron toxicity as regards sugar-cane. The costs of large quantities of calcium carbonate and monocalcium phosphate, as employed, might render the procedure prohibitive on a large scale; still, the experiments would show along which lines fertilising should be carried with soils of this nature.

Summary.

1. A comparison of the Jones' and Hutchinson and McLennan's method of soil acidity estimation favours the former by reason of its simplicity and ease of reproduction of results.

2. The "acidity" of a soil is of little use if we do not determine the nature of the acidity, and in this respect the Hopkins' method is very useful.

3. Of the soils tested, only Nos. 2040, 2041, 2076, and 2077 are in need of lime, while the latter two certainly require a phosphate treatment to reduce the aluminium ion concentration and elimination of its toxic effects.

It is regretted that, in the absence of suitable apparatus, the determination of the hydrogen ion concentrations of these soils was necessarily deferred, as this factor is proving more and more useful in the study of soil acidity and its correction.

TABLE 1.

Sample No.	Locality.	Description of Soil.	React. to Litmus Paper.	Total Acidity.		Mineral Acid.	Organic Acidity. (J – B).	$K - \frac{H^2}{J - H}$
				Jones.	Hutchinson and McLennan.	Hopkins.		
1397	Bundaberg	Red Loam	Neutr.	15 cwt.	29 cwt.	1 cwt.	14 cwt.	·07
1524	Childers	Red Loam	Sl. acid	55 ,,	65 ,,	3 ,,	52 ,,	·17
1622	Ayr	D. Grey Cl. Loam	V. sl. alk.	15 ,,	—12 ,,	Nil	15 ,,	..
1624	Bundaberg	Black Loam	Sl. acid	101 ,,	105 ,,	2·5 ,,	98·5 ,,	·06
1854	Bundaberg	Red Loam	Acid	32 ,,	51 ,,	2 ,,	30 ,,	·13
1887	Homebush	Grey Loam	Acid	53 ,,	39 ,,	3 ,,	50 ,,	·18
2040	South Johnstone	Br. Yellow Loam	Acid	116 ,,	115 ,,	38 ,,	78 ,,	19·00
2041	South Johnstone	Br. Yellow Loam	Acid	120 ,,	116 ,,	45 ,,	75 ,,	27·00
2044	Proserpine	D. Grey Clay	Acid	112 ,,	112 ,,	7 ,,	105 ,,	·47
2069	Bundaberg	Brown Loam	Sl. acid	38 ,,	52 ,,	1·5 ,,	36·5 ,,	·06
2076	Babinda	L. Gr. Clay Loam	Str. acid	118 ,,	114 ,,	91 ,,	27 ,,	307·00
2077	Babinda	L. Br. Sandy Loam	Str. acid	122 ,,	121 ,,	69 ,,	53 ,,	90·00

THE GILBERT RIVER HORSE DISEASE.

By JOHN LEGG, B.Sc., B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon.

The above term is used to describe a condition occurring among horses in certain areas along the frontage of the Gilbert River in North Queensland. It apparently exhibits a marked seasonal and geographical distribution, and frequently, as far as one is able to gather, it presents a characteristic train of symptoms, so much so that the disease has also been named "Walkabout" by the layman. The latter name has been given because the animal in the later stage of the disease appears frequently to attempt to move continually in a forward direction.

The disease seems to have been known in and around the Gilbert River crossing on the Georgetown-Croydon road for at least thirty years. Nearly every year cases occur somewhere in this area. Sometimes there are heavy losses, sometimes lighter, and even in the best years there seems to be always a few cases here. Forest Home, 15 miles above the crossing, occasionally lose a few, while Strathmore and Miranda, 30 miles, and 90 miles respectively below the crossing, have had heavy losses in some years, while at other times they have been quite free.

Geographical Distribution.

The disease occurs along the river flats anywhere from Forest Home Station to Miranda, a distance of about 100 miles. Reports have been received that it has occurred in other areas off the river flats and also on the frontage of other rivers, especially tributaries of the Gilbert, but there is no definite information, and if these do occur the writer has never heard of one—at any rate in recent years. It is possible, too, that an animal in the stage of the disease just prior to the onset of symptoms may have been removed off the Gilbert River frontage, and perhaps miles away the disease has perhaps set in with its characteristic train of symptoms and death followed. Apparently the trouble does not appear to be evenly distributed within the area named. It is common at the Gilbert River crossing, and again at Strathmore 30 miles below, and also at Miranda there were considerable losses in 1923, but it must be remembered that at the particular points named there is a much greater concentration of animals than in the areas between, and also the animals are confined in paddocks at these points, while along the intervening areas of frontage there are very few animals, and what there are are not confined to the river. The question of confinement of animals to the river frontage seems to be an important factor in the production of the disease.

Seasonal Incidence.

The condition exhibits a marked seasonal incidence. It occurs only in the wet season and its onset coincides with the commencement of the rains. It has been stated that the heavier the rains usually the more virulent the disease. This may or may not be so, but it cannot be denied that the last few years having been fairly dry ones, there have not been a great many cases in and around the Gilbert River crossing, a place which seems to have been fairly notorious in the past. At the same time in 1922 Strathmore was a fairly heavy loser, while Miranda further down the river lost a number in 1923.

Symptoms.

The writer has not been fortunate in seeing many typical cases, and the latter description has been built up partly from his own observations, and partly from the descriptions of others.

At first the animal if noticed at all sick in the early stage is found to be dull and sleepy in appearance. There is a tendency to stand apart and isolate itself from the others. In one case this feature had been noticed by the owner in a horse a month almost before violent symptoms set in. This animal, when examined by me a day before becoming violent, seemed in fairly good condition. It stood in the corner of the yard with head depressed and appeared to be dull and sleepy. There was no increase in the pulse or respiration; no temperature was taken, but the animal from appearances did not appear to have any temperature. The animal when fed would eat a while, and then stop and assume a dull, sleepy attitude. When suddenly aroused it would raise its head, commence feeding again only to stop and adopt the same sleepy appearance after a varying period of time. This animal was noticed to yawn frequently. This period of depression varies in degree, and is usually not noticed by the layman, partly because he is very often not a keen observer, and partly because animals are not under close observation.

This period of depression is usually followed by the violent stage, the latter being usually very short, and may be lasting from twelve to forty-eight hours.

Twenty-four hours is usual, though animals may be violent for longer periods, and occasionally three or four days. The shorter the period of violence the greater the degree of excitement, the longer the period the less violent the symptoms. Occasionally an animal has been known to show violent symptoms for a few hours, then appear to quieten down, only to be followed later, perhaps after a couple of days, by the appearance of similar symptoms, which lead to death. In one case brought to the writer's notice the animal had been showing violent symptoms in a very modified form and lived for nearly a week from the onset of the symptoms. Once excitement commences the animal shows a marked tendency to move forward in a more or less straight line or else in circles. It blunders into everything in its way, walking over logs and into fences, and as a result it is not long before the animal's head and shoulders and legs are marked with cuts and bruises and the animal presents a pitiable appearance. What frequently happens is that the animal goes far enough to get caught in a wire fence, and continual struggling ties it up tighter and death soon eventuates.

The animal in this stage when caught can only be held back by force. It leans forward as if attempting to start a load. Profuse perspiration in this stage is common, sweat is continually running from the animal even on a cool day.

Dyspnoea is at times marked, and the breathing so hampered that the animal makes a roaring sound, audible for quite a distance, but such apparently only occurs in the worst cases. In one case seen by the writer there was incontinence of urine. Death quickly follows the exciting stage as a rule. In the bush an animal soon gets tied up in a fence or by continually falling over logs and walking into trees so weakens itself that it soon falls. Its constant struggles on the ground only accelerate the end.

In another case seen by the writer there was a lymphangitis of one hind leg, and a reliable observer states that he has seen two other cases. In the case referred to the hind leg was double its ordinary size and the skin necrosed and ulcerated all round the pastern. Whether this can in any way be regarded as a feature of the disease the writer cannot say, but it appears to be uncommon.

When animals are only mildly excited over a period of three or four days emaciation is very marked, although the animal may quieten down for a while and feed.

Post Mortem Appearances.

Very little alteration is seen in any of the body organs except the liver and stomach. The liver appears to be but little altered in size; the writer unfortunately has not been able to get the weights of the animals and their livers, in order to make a comparison between the relative weight of the liver to the total weight of the body in diseased animals for comparison with normal animals. If anything, this organ is either slightly larger or slightly smaller than normal. The capsule has been found to strip fairly easily. On section, and even before section, the liver is seen to have a peculiar mottled appearance. It varies in colour from a greenish yellow to a greenish grey colour, while on a cut surface the peculiar mottling is particularly noticed and looks somewhat like granite. This mottling is due to the occurrence of small hæmorrhages within the liver tissue. In a few cases seen by the writer this mottling of the liver was very noticeable.

Under the microscope the condition is found to be that of a hepatitis or inflammation of the liver substance. The cells presented an irregular arrangement and the normal radiate appearance had been lost, while at the same time there was evidence of an increase in the fibrous tissue of the part. The dark areas seen on post mortem by the naked eye were now seen to be composed of blood cells produced as a result of rupture of the blood vessels. In an affected liver there would in reality be many thousands of these small hæmorrhages.

The stomach in cases seen by the writer was observed to be enormously distended and was packed full of ingesta. In fact, in the first case seen death had been actually brought about by a rupture fully 2 feet long in the stomach wall. This animal did not present any violent symptoms—it was seen one evening presenting the appearance of an animal in the stage prior to the onset of violent symptoms. It was found next morning dead, and on post mortem an enormously distended stomach, with a large rupture along the greater curvature, and the characteristic appearance of the liver were found. The remainder of the bowels present little alteration. The small intestine is usually empty and the large intestine appears normal. These two factors mentioned—the appearance of the liver and the enormous distension of the stomach—seem to be features characteristic of the disease.

It might be mentioned here that in making post mortems evidence of bruising is frequently seen under the skin in various parts of the body, these being produced during the period of violent symptoms.

Mortality.

Very few horses, if any, recover once violent symptoms have commenced. Owners have stated that such animals recover, but they must be very rare. It is possible that animals may be mildly affected and may exhibit the periods of depression, which are presented very early in the course of the disease, and from this condition they may recover. One case similar to this was actually seen, although the possibility that the animal was suffering from another complaint could not be excluded. However, it occurred during the season when the disease appears, and was probably a mild case.

Cause.

In discussing the possible cause we need to take into consideration the occurrence of similar conditions in other parts of the world, and perhaps what is equally or more important, the marked seasonal incidence and the fact that the disease is confined to certain areas.

Similar conditions to the above occur in South Africa and in New Zealand. In the latter country a condition known as Winton disease was investigated some years ago by Gilruth, and this condition was apparently identical in many respects to the disease under discussion. There a plant known as *Senecio Jacobea* is regarded as being the cause of the disease, and it is claimed that Winton disease can be produced by feeding with this plant.

In South Africa a similar condition occurs known as Dunziekt, which is regarded by many as being also due to poisoning by the *Senecio latifolius*, the latter a plant belonging to the same genus as the Senecio of New Zealand. The writer has not been able to refer to Gilruth's description of the disease and his experiments, but a reference to the reports of the Director of Veterinary Research of South Africa (seventh and eighth reports) indicates that the Australian disease and the South African are very similar.

Starting with this knowledge, we have to consider the seasonal incidence of the disease. As stated before, the disease presents a well-marked seasonal incidence; in fact, it has never been known to occur before the wet season sets in, usually in December or January; and the disease usually commences about a month afterwards. It also ceases soon after the wet season finishes, and about the time the grass dies off, which time depends, of course, on the season, but is usually about the end of April.

Old residents have informed me that an occasional case is seen in May, though these are rare. We also know that the disease is confined to certain areas—*i.e.*, the frontage of the river. All the residents along the river have horse paddocks on the river flats, and it is in these paddocks that the disease occurs. Where there are no paddocks, and where the horses run out, the disease is practically unknown, even where the horses have access to the flats.

No experiments have been performed to ascertain whether the disease is inoculable or not. These have never been performed simply because of the difficulty of obtaining and keeping animals under observation, and also because of the isolation of the area in which the disease occurs; but although one cannot be absolutely certain, yet the disease is one that we would hardly expect to be inoculable.

It has been contended that the disease may be set up as a result of parasitic infection; but this theory is ruled out, because similar infestation by intestinal parasites is found practically all over North Queensland.

Taking the whole of these factors into consideration, and bearing in mind the close similarity the Gilbert River horse disease bears to similar diseases in other countries where the latter is known to be or strongly suspected to be due to plant poisoning, we see that this theory almost entirely fits the condition as it occurs in Queensland.

During the wet season along the river banks there is great and rapid growth of many weeds and grasses. These grow so rapidly that in a few weeks they have reached their maximum growth and go to seed. It is during this period of rapid growth that the disease occurs; and once the new growth is finished and drying off has begun the disease disappears. Off the river and on the higher ridges the flora is of a more hardy nature and quite different to that found on the flats. The disease does not apparently occur in these latter areas. It seems to the writer highly probable that the condition will one day be found to be due to the ingestion of a plant or plants which grow along the river banks in these areas.

There are several leguminous plants, including some of the genus Crotolaria, known to be poisonous to stock in other countries which might be incriminated; but the variety of plants is so great and the area so isolated that it makes experimentation very difficult. Besides there is the evidence I have already indicated, and that is that if horses are kept off the river flats and kept on the ridges for the wet season the

disease would in all probability largely disappear. This should be possible in many cases, as the river flats are only narrow strips, and owners are recommended to do this. So far as treatment of the disease is concerned, this would seem impossible. The disease has apparently been in existence some time before the animal is noticed ill, and it is only when the animal becomes more or less violent that it is noticed by the owner. It is then practically beyond treatment.

So far as we know at present, the only rational method of preventing the disease is by keeping the river flats clear of horses during the wet season. No owner had done this; but the apparent immunity of animals kept on the ridges is so obvious that the suggestion is well worth a trial.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL 1924 AND 1923, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April. 1924.	April. 1923.
North Coast.				
	In.		In.	In.
Atherton	4·49	23	1·56	2·98
Cairns	12·02	42	20·38	5·01
Cardwell	9·66	52	11·35	5 69
Cooktown	9·11	48	9·11	4·64
Herberton	4·30	37	1·17	1·95
Ingham	8·80	32	9·77	6·84
Innisfail	21·48	43	18·42	15·37
Mossman	12·00	15	10·85	5·64
Townsville	3·78	53	5·24	1·16
Central Coast.				
Ayr	2·80	37	5·18	0·55
Bowen	2·86	53	6·51	0·85
Charters Towers ..	1·74	42	2·54	0 84
Mackay	6·74	53	7·51	4·66
Proserpine	6·61	21	6·46	2·36
St. Lawrence ...	2·80	53	4 30	3·21
South Coast.				
Biggenden	1 87	25	1·60	5·74
Bundaberg	2 97	41	1·37	6·60
Brisbane	3 61	73	2·67	5·83
Childers	2 61	29	1·59	6 91
Crohamhurst ...	5·70	30	3·22	14·39
Esk	2·61	37	1·94	2·43
Gayndah	1·34	53	1·04	3·35
Gympie	3·17	54	3 03	7·23
Glasshouse Mts. ...	5·27	16	4·05	11·05
Kilkivan	2 07	45	2·45	2·37
Maryborough ...	3·43	53	2·54	9·19

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April. 1924.	April. 1923.
South Coast—continued:	In.		In.	In.
Nambour	5·45	28	4·88	19·06
Nanango	1·83	42	0·55	1·71
Rockhampton ...	2·27	37	4·71	2·82
Woodford	4·21	37	2·23	7·14
Darling Downs.				
Dalby	1·22	54	1·20	0·45
Emu Vale	1·14	28	2·47	0 61
Jimbour	1·24	36	0·96	0·30
Miles	1·36	39	0·21	0·29
Stanthorpe ...	1·67	51	1·39	0·78
Toowoomba ...	2·43	52	1·73	0·74
Warwick	1·62	59	2·32	0 36
Maranoa.				
Roma	1 25	50	1·50	0·86
State Farms, &c.				
Bungeworgorai ...	0·79	10	1·48	0·91
Gatton College ...	1·59	25	1·58	0·75
Gindie	1·19	25	1·02	1·21
Hermitage ...	1·20	18	2·01	0·36
Kairi	5·13	10	2·47	3·86
Sugar Experiment Station, Mackay	5·24	27	6·47	3·66
Warren	1·30	10	2·79	2·23

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April, 1924, and for the same period of 1923, having been compiled from telegraphic reports, are subject to revision.

J. H. HARTSHORN,
Acting State Meteorologist.

ATHERTON TABLELAND PIG POOL.

NEW BACON FACTORY OFFICIALLY OPENED.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

It is some two years now since the formation of the Atherton Tableland Pig Pool Board, which controls the sale of pigs throughout the Cairns Hinterland and Atherton Tableland districts, and during that time an immense amount of work has been done in building up and stabilising the organisation which has resulted in the erection and completion of the North Queensland Co-operative Company's Bacon Factory at Floreat Siding, adjacent to the township of Mareeba, on the Cairns-Herberton Railway, at a total cost of £13,500.

Prior to the formation of the Pig Pool the pig industry had suffered many ups and downs, and matters had become so unsatisfactory that it became apparent that, unless some organisation could be established to control the marketing of pork and bacon pigs, the industry would become unprofitable and farmers would give up in despair.

PLATE 78.—THE OFFICIAL OPENING CEREMONY OF THE NORTH QUEENSLAND CO-OPERATIVE BACON COMPANY'S FACTORY AT MAREEBA WAS PERFORMED BY MR. JOHN NEWELL, ONE OF THE OLDEST PIONEERS ON THE TABLELAND.

Seasonal conditions had not been altogether favourable and several outbreaks of disease had checked the development of pig raising, so that at the time the Pig Pool came into operation prospects were anything but bright, both from the standpoint of the producer as well as that of the manufacturer and the consumer. The farmers were very suspicious of any new organisation aiming at successfully controlling the marketing of their pigs, for they had suffered considerable loss as the result of an attempt by a private individual to open up a bacon factory and thus encourage the industry.

Fortunately, the first Pig Pool Board consisted of men well versed in the failures of previous ventures, hence they acted in a most conservative manner in originating their scheme, which became possible finally by the passing of the Primary Producers' Organisation Act, which aims at supervising the marketing of all agricultural produce in this State, or at least in those districts coming within the scope of the Act.

In order to successfully control the marketing of the pigs raised on the Tableland two schemes had to be put into operation; first, a scheme covering the marketing of porkers to butchers within the Cairns-Townsville and surrounding districts, and secondly, the erection of a bacon factory, within the cellars of which the bacon pigs could be converted into first-class bacon, hams, and small goods.

The scheme covering the sale of porkers to local butchers is still in operation and will continue as an integral part of the Pig Pool operations, the pigs being slaughtered at the bacon factory and sold to the butchers at per pound, transport being arranged per refrigerated car on the Cairns Railway to the various districts concerned; and now the bacon factory is actually in operation and is capable, for the present at any rate, of treating from 200 to 250 pigs per week or more; the factory has been constructed in such a way as to allow of extension of operations as required at a later date. Floreat Siding, Mareeba, has been chosen as the site for the factory for several reasons. First, because it is central in so far as railway transport is concerned, it being on the main line from Cairns to Herberton and practically at the junction of the railway lines serving the Tolga-Millaa Millaa districts, as well as the Mount Molloy Branch. This site also serves the whole of the

Photo.: O. M. Proll, Atherton.]

PLATE 79.—THE NORTH QUEENSLAND CO-OPERATIVE BACON COMPANY'S NEW BACON FACTORY, OFFICIALLY OPENED AT FLOREAT SIDING, MAREEBA, ON SATURDAY, 17TH MAY, 1924.

The Factory is under the control of the Atherton Tableland Pig Pool Board, and has been erected at a total cost of £13,500.

Tableland districts, and will be equally convenient for the despatch of the finished article in the form of bacon, hams, small goods, fertiliser, and offal generally.

From a climatic standpoint the Pig Pool Board considered Mareeba district the most suitable, and this factor was in reality the one responsible for the final decision. Then, again, for both fuel and water supply the district chosen has many advantages. Firewood is in abundant supply for conversion into charcoal, for the power will be derived from a gas suction plant, and the water supply has been carefully analysed and tested and is sufficient for all requirements. A great deal of detail work has yet to be done before the factory is in full swing, but on opening day, 17th May, a large number of carcasses were already in process of curing and operations were in progress generally.

The official opening ceremony was in the hands of Mr. John Newell, one of the oldest pioneers and a man who has succeeded in building up a successful business in spite of all the inconveniences and drawbacks with which, even in these days, the pioneer is faced.

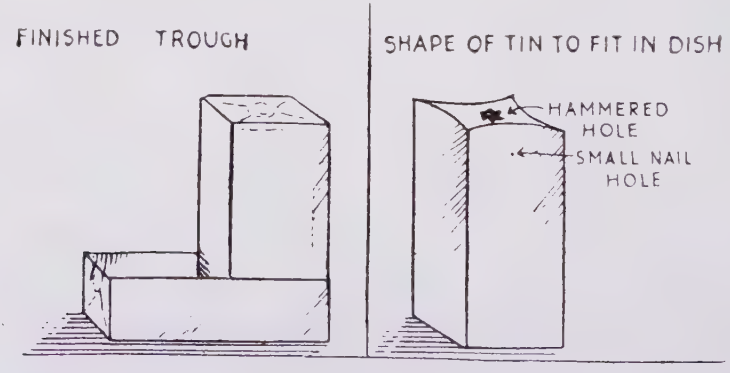
Mr. M. Lynch, chairman of the Pig Pool and of the Bacon Company, introduced Mr. Newell.

Mr. Newell, who was greeted with applause, expressed his very great pleasure in having been chosen to officially open the factory, and thus commence operations which he felt sure would eventually result in the pig industry being recognised as one of the most prosperous and profitable of all the ventures on the Tableland. Mr. Newell has been resident for over forty-five years in North Queensland so claimed to be in a position to fully appreciate all that had been done in opening up that wonderful belt of country, some millions of acres in extent, which was generally referred to as the Atherton Tableland. He considered that united action made for progress more than any other method, and considered that now was the time for farmers generally to pull together to ensure the success of this as well as the several other co-operative schemes in operation throughout the district. He thought the bacon factory was the thin end of a wedge that would eventually open up the great Northern districts to a thickly populated and prosperous centre. It was estimated that to-day there were 400 pig-raisers on the Tableland; he thought there would be nearer 600 next year, and that progress would be rapid.

After the official opening ceremony and the "Basket Picnic," an official banquet was held at Dunlop's Hotel, Mareeba, at which a large toast list was honoured.

A SIMPLE DRINKING TROUGH FOR POULTRY AND DOMESTIC ANIMALS.

The accompanying diagrams show a device which anyone can make and which is most effective for supplying poultry, dogs, &c., with clean water. Cut a benzine tin in half lengthways (turn the edges over) to form a shallow dish 3 inches deep. Then take another benzine tin and with a hammer knock a hole in the centre of the end which has been opened to empty the benzine. In making this hole the sides



will be drawn slightly inwards enabling it to fit inside the shallow dish. The end will also be made concave, and this will act as a funnel when filling. On the side of the tin—2 inches from the concave end—make a small nail hole, fill the tin with water, and turn it quickly upside down into one end of shallow dish. The water in the dish will only rise to and keep at the level of the nail hole. Place in a shady spot and you will have four gallons of clean water which will generally last several days without contamination.

WATTLE BARK.

THE POSSIBILITIES OF ITS CULTIVATION IN QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

Paper read before the Master Tanners' Association, 6th May, 1924.

Several futile attempts have been made in the past to grow tanning wattles on a commercial scale in Queensland, but really nothing of a systematic nature, backed by technical knowledge, has been attempted.

Australia, in the barks of its indigenous wattles, possesses one of the richest, if not the richest, sources of tannin in the world. The use of wattle bark is on the increase, and in England the bark and tan extract, along with other extracts, are largely taking the place of older tanning substances, such as oak bark, which were previously used.

Species of Wattles.

Australia possesses over 300 indigenous species of wattle trees, but the barks of only a few of these are of commercial importance as tanning material.

The wattle yielding bark richest in tannin is the Golden Wattle of South Australia (*Acacia pycnantha*), commonly known among the growers and collectors as the "Pycnantha Wattle." It is a native of South Australia, Victoria, and New South Wales, in the last State being confined in its natural distribution to the country adjoining the Victorian and South Australian borders respectively. It has been introduced into Queensland at different times, but, in my opinion, is a species quite unsuited for cultivation on a commercial scale in Queensland.

It certainly will grow here, but to do really well and to reproduce naturally it requires a dry summer and a wet winter, the exact reverse to what usually occurs in Queensland; and, though the plants will stand a great amount of heat, they can rarely stand heat plus moisture, and if we experience a hot, moist summer the plants may die out, even though they be several years old. The Pycnantha Wattle is a small shrubby species, averaging 12 to 14 ft. high and a few inches in diameter. The remarks I make under cultivation will not apply to this species, as it is of no importance as far as wattle cultivation in Queensland is concerned.

The next richest wattles in tannin content, but still more important from the actual amount of wattle bark used at the present time, are the acacias or wattles known as the decurrens group of wattles (*Acacia decurrens* and its varieties). There are six named varieties, at least three of which occur in Queensland. They are known commonly as "Black Wattles" or "Green Wattles," names also applied, however, to wattles other than those of the decurrens species.

The most important tan-bark variety is *Acacia decurrens* var. *mollis* or *Acacia mollissima*, which occurs in all the eastern States, including Tasmania and Queensland. In our State it is confined to the country near the New South Wales border, near Stanthorpe and Wallangarra, and westward to Goondiwindi. The bark, however, so far as tested has proved to possess a lower tannin content than the New South Wales trees, and those from Victoria again are reputed to yield, on an average, 2 to 3 per cent. more tannin than the New South Wales trees; and some of the best tanning bark comes from Tasmania.

This island State also has an advantage in that the only variety of the decurrens group which occurs there is the variety *mollis*, the best for tannin content. This, in the past, prevented a mixture of varieties in gathering wattle growing in South Africa. This variety is the one that was introduced into South Africa some thirty odd years ago, and the cultivation of which has reached large proportions, particularly in Central Natal.

In Natal, where the seasons, I think, correspond pretty closely to ours, the land (virgin grass land) is broken up about Christmas time and thoroughly harrowed. The seed is sown in February in holes about 6 ft. apart in rows 12 ft. distant from one another. The seeds are planted direct after treatment, and the raising of plants in nursery beds not practised. In the larger plantations light tramways are run into the cutting area and the bark transported to the drying yards. The strips are then hung over poles to dry, the inner or wet side downwards. The poles are so arranged along run-aways that they can in the case of wet weather be run into a drying shed.

The annual output of bark in South Africa is estimated at about 55,000 tons; about 4,000 tons is used locally and the rest exported, mainly to England, but nearly 2,000 tons finds its way to Australia, the native country of the wattle.

Australia's consumption of tanning bark is estimated at about 26,000 tons, of which about 23,000 tons are produced locally, the remaining 3,000 tons being imported; this last consists of bark mainly from South Africa.

South Africa has, perhaps, several advantages over Australia as a field for wattle-growing on an extensive scale. These advantages include cheap imported labour and a good local market for the wood for mining props and fuel. Both in Natal and British East Africa large factories have been erected for the manufacture of tan extract, the analytical work carried out in the Cedara School and elsewhere forming the basis for the development of this side of the industry. Methods of utilising the wood other than for mining props and fuel are under review. It has been tried for paper pulp, but is thought to be too short in the grain for any except the coarser kinds of paper. It is unsuited for case-making as it does not nail well. I have seen it reputed that the wood has valuable by-products, but I have not been able to get definite information on this point. The spent tan is being tried in the making of felt.

Area Suitable in Queensland.

In my opinion the only areas in Queensland suitable for wattle cultivation is the country between, say, Warwick and the New South Wales border and westward for about 100 miles. Some of the poorer country about Crow's Nest, at present not used in any way except for perhaps grazing, would no doubt prove suitable.

Before embarking on the formation of wattle plantations in Queensland, it would be wise to establish small experimental areas, say of 10 acres each, to test firstly if the *Acacia decurrens* var. *mollis* does well in the locality, to find the best time of sowing, the best time for stripping and barking, and to find if there is any diminution in the tannin content as compared with the bark from Southern trees. Perhaps other varieties could be tried at the same time.

Soil.

Although, speaking as a very general rule, wattles grow on poor soil, mostly sandstone, under cultivation on better soils the trees grow to a larger size with a corresponding increase in the yield of bark. The quality of the bark is also said to be better from trees grown under these latter conditions.

Methods of Planting.

Seeds may be sown at different times of the year, but May is generally regarded as a good month for general sowing. August sowings have also proved successful.

Two methods may be adopted: the seed may be broadcasted or planted in rows. In the former case each pound of seed should be mixed with half a bushel of sand to ensure a better scattering of the seed. If the country is covered with bracken, dry grass, or undergrowth of an inflammable nature the whole field can be fired and germination helped, thus doing away with the necessity for soaking the seed. The plants when large enough should be thinned out to about 10 feet apart each way.

The seed has a hard external coating which it is necessary to soften or crack before germination can take place. This may be done in several ways, but the best is probably soaking in hot water. Boiling or almost boiling water should be poured over the seed, which should be allowed to soak for about twenty-four hours. Only enough seed should be soaked for one day's sowing. The seeds thus treated when sown must be immediately covered with about half an inch of soil to prevent them drying out. If the seeds are found covered with a gelatinous material and it is found in consequence difficult to sow them, they may be washed in fresh well water mixed with only sand.

The best method of planting the seeds is in rows, a few seeds being dropped about 6 feet apart with the rows 12 feet from one another. Some growers, I believe, plant more thickly than this. In most cases the man of average intelligence will soon find the most economical and rapid method of sowing suited to his conditions. For broadcast sowing 4 to 5 pounds of seed will be required, and for sowing in rows 1 to 1½ pounds per acre will be found sufficient.

In smaller areas the plants can be raised in a nursery and transplanted out later. The plants can be raised in trays (kerosene tins cut longwise), pots, tins, or bamboo tubes. The last should be suitable for comparatively large areas. Bamboo or reed is cut into lengths of about 5 inches, stacked tightly one against the other, then filled with fine soil. Two seeds are sown in each tube, and when the plants are a few inches high they are planted out into their permanent positions tube and all, the tube of bamboo eventually rotting away. In areas where the principal tan wattles will do best bamboos will not grow, but their place can be taken by the Spanish reed (*Arundo Donax*), known commonly in the Southern States of Australia as "Bamboo." In the State Forest Nurseries of South

Australia, the reed system is largely used, and areas are specially set aside for the growing of the Arundo and a small engine is employed for cutting up the sections. Old tins and twists of brown paper have also been used with considerable success.

Stripping.

Stripping is best done when the trees reach maturity; an average age being seven years. If allowed to over-mature, say trees of over ten years of age, the tannin content is less and becomes darker in colour. The trees are usually stripped when in bud or flower—that is when the flow of sap is most active—September-December being the most favoured months, but local conditions must be taken into consideration and the best time for stripping found by analysis of the bark at different times of the year. Unfortunately, in Queensland, the active growing season corresponds with the rainy one, and times for stripping may have to be altered accordingly. After stripping, the bark is dried for a week or two, with the inner or wet side innermost, bailed or cut up into short lengths and bagged.

Yields.

The average yield of bark from seven-year old trees is said to be about 3 tons per acre, with the low estimate of £8 per ton at the nearest railway siding, should represent a very payable crop per acre, especially for poor land at present earning hardly anything.

Extracts.

Very little has been done in Australia in this direction as yet, but the utilisation of the smaller branches, twigs, and leaves for extract opens up considerable possibilities. These parts contain considerably less tannin than the bark, averaging probably about 10 per cent. I have not got the percentage for any of the "Decurrens Wattles," but J. H. Boas gives 14 per cent. as an average for the "Pycnantha Wattle" in Victoria and South Australia, and that of Decurrens is likely to be considerably less. Under modern methods of extraction, however, any material containing 10 per cent. or over is worthy of trial. The wood as a possible source of extract has, as far as I know, not been thought of. The gummy matter present in the twigs can be easily eliminated, according to W. Helms, on lines similar to those in use in the manufacture of sugar.

At present tan extracts are extracted principally from the wood of the Quebracho (*Quebrachia Laurentzii*), large forests of which are said to exist in the northern parts of the Argentine. D. E. Hutchins, in his "Discussion of Australian Forestry," says that at present French tanners use little else.

Large factories have been erected in Natal and British East Africa for the making of tan extract from wattles. I believe in these cases the bark is the part used; the extract is marketed both in liquid and dry form.

Summary.

1. The wattle most suited for plantation purposes in Queensland is the "Black Wattle," known locally as *Acacia decurrens* var. *mollis*, or *Acacia mollissima*.

2. The area most suited is that stretching from Warwick to the New South Wales border and westward for about 100 miles. Crow's Nest and Killarney are also suitable localities.

3. Before embarking on an extensive scale in wattle planting, small areas of about 10 acres each should be laid down to note the growth of the tree under different conditions, the best time for sowing, and the best age and months for stripping; also to note if any diminution in the tannin content from the Southern trees results.

Acknowledgments.

In writing the foregoing account of "Wattle Culture" I had much help from the following publications, to which persons desirous of further information are directed:—(*a*) J. H. Maiden's "Wattles and Wattle Barks," 3rd edition, Government Printer, Sydney; (*b*) D. E. Hutchins' "A Discussion of Australian Forestry," Government Printer, Perth, West Australia; (*c*) various articles in the "Australian Forestry Journal," particularly "Tanning Industry and Wattle Cultivation," by W. Helms, in the number for June, 1923. For information with regard to the industry in South Africa I am indebted to a paper "Wattle Growing for Bark," by L. E. Taylor, in the "Transvaal Agricultural Journal" for January, 1910, and an article by David G. Fairfield on "The Cultivation of the Australian Wattle" in Bulletin No. 51, Bureau of Plant Industry, United States Department of Agriculture.

SUGAR: FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports under date 20th May to the Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby):—

Goodwood.

There is every prospect of a good harvest, although hail has caused some damage. Very little damage is being done by borer or other insect parasites, and a minimum of damage is being caused by leaf disease. The standard of cultivation is good. Cane varieties doing well are Q. 1121, Q. 970, Petit Sonneville, M. 1900 Seedling, D. 1135, and Uba.

Growers are advised to keep a sharp lookout for Mosiac and Striped Leaf disease. In addition to the symptoms showing in the leaf, the cane will after a time begin to canker, and the internodes will be shrunken and weak looking. Cracks may appear, causing the cane to dry up. The stick may throw out aerial roots at the nodes.

Growers are advised to go in for more green manuring. The farms are mostly on slopes, therefore, in addition to enriching the soil, the green crops would have the effect of binding the soil and prevent, to some extent, soil washing.

Maryborough.

Farmers in this district in the course of the past twelve months have undertaken canegrowing in earnest, with the result that there will be heavy crops this season. Varieties doing specially well are Meerah, Rappoo, D.1135, M. 1900 Seedling, Malagache, and Q. 813, also Mauritius Ribbon. Of these canes it is probable that Q. 813, M. 1900, and Meerah are doing best. The two first-named canes are, however, not susceptible to "gumming." Meerah is.

Practically no leaf disease was discovered. Growers are advised to keep a sharp lookout for gum. By taking a cane knife and cutting a stick diagonally if there is gum present it will be seen coming out in small yellow globules on the face of the cut. If the disease is found to be present in a field farmers are advised not to take plants from that area, and to plough the stools out and spell the ground after the cutting. Gumming disease is very infectious.

As previously mentioned in reports on the Maryborough district, the growers are advised to use more lime and green manures.

Farmers are also advised, when they are experimenting with varieties of cane, to have a separate plot away from the main fields, and keep it clean and well tilled. The name of each cane should be painted on a peg at the end of the row. It is useless obtaining varieties and putting them on a headland to fend for themselves.

Pialba.

Exceptionally good crops will be cut this year. The cane is very sweet even now, and the growth is strong. Farmers are doing better cultivation than hitherto, and the weed growth is well in check. Some farmers, especially those at the Mountain, want better facilities for getting their cane to the railway. The crops at the last-named place are particularly good, and the district round the Mountain is fertile and picturesque generally. It is suggested that a strong endeavour be made to obtain a tramline.

Canes doing well in the Pialba district are H.Q. 285, D. 1135, J.K. , Q. 813, Q. 970, Q. 1121, J. 247. Of these, growers are advised to plant H.Q. 285 and Q. 813. Both these canes are, so far, resistant to disease and hardy growers.

Lime is badly needed on most of the Pialba soils. Potash also appears to be deficient. Much of the land is also apparently lacking in humus. This could be remedied by the planting and ploughing in of green crops, such as cowpea and Mauritius bean. Soils rich in humus have a great capacity for holding water. They also attract the heat and minimise the likelihood of frost. Air gains admission to the soil better when plenty of humus is present. In clay soils lightness and friability is obtained.

Farmers are advised to subsoil with a skeleton plough in the Pialba district. They are also recommended not to plant too deeply. Eight inches should be sufficient.

Yerra.

The cane here is well grown and vigorous. There is every prospect of a good crushing. As previously mentioned a great drawback in this district is haulage to the railway.

Cane varieties that are principally planted and doing well are Q. 813, D. 1135, and M. 1900 Seedling. The farmers are recommended to try H.Q. 285.

PLATE 80.—FIELD DAY AT BUNDABERG SUGAR EXPERIMENT STATION, 31ST MAY, 1924. CANEGROWERS ASSEMBLED.

Mount Bauple.

The cane is healthy and well grown, very little disease or fungus attack showing. New land is being planted, one piece belonging to Mr. Ryder looking particularly well. Farmers here are considering the possibilities of mechanical traction in the district, tractor demonstrations being well attended.

Satisfactory varieties include H.Q. 285, D. 1135, Q. 822, M. 1900 Seedling, and Meerah. The first-named looks particularly well. There is some excellent cane for planting showing, and by utilising the best next season the good standard should be maintained. There is a considerable infestation of leaf hopper at the present time. As an actual parasite they are not doing much damage, but as a media of infection with regard to "gumming" or Mosaic they may be serious should these diseases occur with any degree of frequency. In order to minimise the spread of disease, in addition to careful selection of plants and elimination of scattered diseased stools, it is advisable not to plant too closely, especially with regard to the broad-leaved varieties, many of which are suspectible.

The cane looks exceptionally well along the banks of the Mary River about Tiaro. Much of this land is made by river deposits and is very fertile. Q. 813 is a vigorous grower on these flats.

It is suggested that farmers with river frontages plant willow trees to bind the banks. In additon to holding the soil, the willow is relished by stock in all seasons.

SUGAR PESTS AND DISEASES IN THE MACKAY DISTRICT.

Queensland 9th May, 1924.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report on pests and diseases in the Mackay and Lower Burdekin Districts from Mr. W. Cottrell-Dormer:—

Survey of the districts of Rosella, Homebush, Sunnyside, Oakenden, North Eton, Mia Mia in the Mackay Area, and the Lower Burdekin district. Fifty-two farms were visited.

HOMEBUSH AND NORTH ETON AREAS.

Diseases.

Like the remainder of the Mackay districts, these areas were found fairly free from serious diseases. However, disease was very prevalent on one farm at North Eton. This was on Mr. W. Jackson's farm, which adjoins the mill. Every variety on the place was affected to a greater or lesser extent. The Badila, which constitutes the greater portion of Mr. Jackson's crop, and plant Badila seedling are but slightly infected, the D. 1135, Q. 970, ratoon Badila seedling, and Forage Cane about 10 per cent. to 20 per cent. This insidious disease does not at once show drastic effects on the infected canes. It is slow in action, and often runs for three or four years before the stunting of the cane is noticed. For this reason it is a disease which many farmers do not worry about, and often when they see the characteristic leaf markings they mistake the altered appearance of the leaves of affected stools for some unaccountable "sport" action which does not injure the crop. So it would be an excellent plan for as many of the Eton and North Eton growers as can spare the time to call on Mr. Jackson and ask to be shown some of the diseased cane. It would only take a few minutes, and Mr. Jackson would be able to tell them a good deal about the disease. Once these growers had seen the disease in question they would never fail to recognise it if ever it occurred in their own fields. This would enable them to eradicate the disease from their own crops at its earliest appearance by destroying affected stools. In Mr. Jackson's case this is impracticable as almost all of his crop is affected. He will, however, succeed in besting the difficulty by ratooning only his Badila, which is a rather highly resistant variety, and planting up all other varieties from fresh stock. It is only by whole-hearted co-operation amongst growers that such menaces can be dealt with.

A slight amount of Top Rot disease was observed in Malagache cane, near Homebush. All of the farmers interviewed by me between Baker's Creek and Homebush mentioned this disease, giving drastic accounts of its ravages in recent years. It appears that Malagache and Rose Bamboo are especially susceptible in these districts, and some growers have been obliged to forego cultivating these varieties because of that weakness. This year there is very little of the disease about.

PLATE 81.—MR. H. T. EASTERBY, DIRECTOR OF SUGAR EXPERIMENT STATIONS, AND MR. J. C. MURRAY, SOUTHERN FIELD ASSISTANT.

PLATE 82.—A BUNDABERG FIELD DAY—CANEGROWERS DEEPLY INTERESTED.

Grubs.

Though very small patches of cane are occasionally affected by grubs in the Homebush, Sunnyside, Oakenden, and Eton districts, yet this damage is so slight and so dependent on dry seasons as not to call for active control measures apart, of course, from the usual collecting. During the past season only 5 or 6 lb. of grubs and beetles were received in the Sunnyside and Oakenden districts. With such results as that there is a tendency to neglect the collecting. Needless to say this is a big mistake. On the other hand, rather serious grub damage was found to have occurred, being helped by auspicious climatic conditions, in the Rosella and Mia Mia districts. In the former locality, Messrs. Iwers and Son were the greatest sufferers, and in 1923 they lost between 100 tons and 200 tons of cane through the ravages of *L. albohirtum*, and at this time last year as many as fifteen grubs could be found under each stool in affected area merely by uprooting the stool by hand.

Several other growers in this locality—say about a half-mile radius of Rosella—also experienced rather severe losses. All were unanimous that such damage was quite unusual and never occurred in good seasons. All this land has been under cultivation for many years, and is to a large extent devoid of humus, so that it is inclined to set very hard. Much rain had fallen during the previous forty-eight hours so that I was quite unable to tell whether soil would be suitable for fumigation. At Mia Mia the affected land is comparatively new and is fairly porous, so that fumigation would probably be attended by success. Severe losses were experienced in this district also, and two neighbouring growers, Mr. A. Breadsell and Mr. Nielson, with farms on the banks of the Pioneer River, estimate their losses for 1921 at 150 tons each, and damage has been bad each year since.

Another grub which does slight damage in the Rosella district is *Lepidiota frenchi*, several of which I found under stools at Messrs. Iwers and Son's in their second stage. Other grubs found during my visit were the ubiquitous *Neso flavipennis Haplonycha* sp. and *Heteronyx* sp., none of which are of any economic importance.

Other Insect Pests.

Mention was made by some growers of slight damage from wire worms (*Honcerepidius* sp.) in low-lying fields. A few "misses" are occasionally caused by this pest, but the damage does not in any way approximate its extent in districts closer to Mackay. The small white ant (*Termes* sp.) is also responsible at times for slight destruction in some fields, but this is not at all serious. The Tenebrionid beetle (*Gonocephalum torridum*), whose small cylindrical wire worms gnaw the very young cane roots, was found at Rosella and Sunnyside in tremendous numbers. One night at Homebush, after doing some writing in my room, I was obliged to shake all my bedding to clear these beetles out. They had come to the light in hundreds. The common small black plant bug usually found in the soil of cane fields was also very plentiful. The "Large Moth Borer" (*Phragmatiphila truncata*) was found to be scattered throughout the district, but its damage is but slight and is mostly confined to fields badly infested with weeds and grass. The sugar-cane aphis (*Aphis sacchari*) was met with on one farm at Oakenden, though it is undoubtedly scattered throughout. In this case the Aphis colony was accompanied by Coccinellid beetles and Syrphid flies in all stages, these being both natural predaceous enemies of the Aphis. The following non-important minor pests were encountered throughout the districts and especially in fields of Badila or other thick-leaved varieties: Leaf Minor (*Cosmopteryx*), Bud Moth (*Opogona*), Mealy Bug (*Pscudococcus*), Leaf Hoppers (*Perkinsiella* and *Astorga*), and Grasshoppers. In my previous reports I have omitted to mention the general distribution throughout all districts visited of *Mocis frugalis* and *Chloridea obsoletd.* Both of these moths are facultative cane pests, and I have been finding them on grass and corn respectively. These are their natural food plants, and cane is not usually attacked unless these are lacking. The former insect is especially plentiful at Netherdale, where it is to be found in thousands among the grass.

Enemies of Cane Pests.

Under this heading I should like to mention the very general and plentiful occurrence of the commoner Robber Flies (*Asilus illingworthi, Ferrugineiventris*, &c.) and *Carabidæ*. The larvæ of both of these are enemies of cane grubs and other soil-loving pests. I did not observe any Digger Wasps.

Wallabies.

By far the most serious pest to be coped with in dry seasons in these districts is the wallaby. In fact at Sunnyside it is practically the only serious pest. It is not unusual for a grower to lose as much as 50 per cent. on some fields.

PLATE 83.—A TRACTOR IN ACTION.

PLATE 84.—FIELD DAY AT BUNDABERG SUGAR EXPERIMENT STATION.
Tractor Demonstrations in Red Volcanic Soil.

LOWER BURDEKIN.

Diseases.

Two very serious diseases were met with throughout the Lower Burdekin districts. These are Top Rot and Leaf Stripe. As great concern is felt throughout about Top Rot, and more so on the Home Hill side of the river, where the disease is at its worst, I made special observations in this connection. These observations, and the experiences of farmers in affected areas, coincided in every way with the very complete ones made by Mr. H. Tyron in 1905 and described by him in his invaluable bulletin. In the great majority of cases it was found that the Top Rot was at its worst in fields in which for some reason the watering had been neglected at some time and in late planted fields. Just as in Mackay Malagache has proven a very susceptible variety, so in this district Badila seems to contract the disease very easily. Other varieties grown in this district are, on the whole, but slightly affected. The most resistant of the widely grown ones, according to my observations, are Clarke's Seedling, Brown Goru, and B. 208. The latter cane appears to do very well here. Green Goru is not quite so resistant as Brown Goru. M. 1900 Seedling, like Badila and Malagache, is a highly susceptible variety. In the course of the few days that I spent at Home Hill, Mr. Barton, Cane Inspector, of Inkerman Mill, who is keenly interested in any measures towards the control of Top Rot and other diseases, took me through several widely separated fields showing losses of from 10 to 20 tons per acre. There is not one field of Badila in the Home Hill district which is perfectly free from Top Rot. One or two sticks can always be found after a few minutes' searching in the healthiest cane, and in some fields every stool is affected, and from three to ten dead sticks may then be found in each. I do not consider that Top Rot is spread through planting. Several examples could be given to support this statement, one of the best being a small crop of Badila belonging to Mr. P. King, which was grown from plants cut from a badly diseased crop of Badila last year at the State Farm; it now promises to cut upwards of 40 tons to the acre and shows scarcely a sign of Top Rot; whereas another crop of Badila belonging to the same grower, and grown from apparently healthy cane, is now very badly infested with the disease. Both crops received the same cultivation, but the healthy cane was better watered than the other.

Though one occasionally sees a stool of Badila slightly affected by Leaf Stripe disease (*Sclerospora sacchari*), this disease seems to be confining its attentions almost exclusively to B. 208, which as is known to every grower, is the most susceptible variety. Some farmers are trying hard to keep this variety in the district by growing only the healthiest cane and by doing all in their power to keep the disease in subjugation. However, their efforts are rendered useless by the carelessness of some other growers who persist in ratooning diseased blocks. These ratoons, which do not always give expected results owing to neglect or other causes, are sometimes kept for standover and are thus a hot-bed of disease and a serious menace to surrounding fields. Blocks in which this disease is prevalent should be ploughed out as soon after cutting as possible. On one farm at Airedale I was shown some first ratoons. There were eighteen rows of Brown Goru and to windward of this was a block of B. 208. Separating these were three rows of Q. 903. The B. 208 was rather badly infected with Leaf Stripe throughout. In the first couple of rows of the Brown Goru—*i.e.*, those nearest the B. 208—diseased stools occurred every here and there; the Q. 903 was quite free from it. This demonstrates the very infectious nature of this disease, since the Brown Goru did not have to be in contact with the B. 208 to become contaminated. Incidentally the power of some varieties to resist certain diseases is also shown.

Grubs.

Damage by grey-back grubs is rather serious along Plantation Creek, in the Jarvisfield and Airdmillan localities, but their ravages do not appear to extend to surrounding districts. As I busied myself mainly with diseases in this district, I could not devote much time to the grub question. Though the soil when dug up appears loose enough for treatment, it is impossible to say definitely without actual trial whether fumigation would be successful. This is on account of irrigation, which may serve, to a large extent, to destroy the porosity of the soil. Mr. J. McIlroy, of Jarvisfield, who is the principal sufferer in this respect, turned up very great numbers of dead beetles when ploughing earlier in the year. Some of the older residents mentioned that beetles were a great deal scarcer than usual during the past season. No signs of grubs are yet showing, so that it is hoped that damage from this source will not be very great this year.

While following a plough at Jarvisfield I found two second-stage grubs of *Dasygnathus australis*, commonly known as "Red Heads," feeding on the old stools which were being ploughed out, and one grub of a *Bolboceras* sp.

PLATE 85. MACHINERY AND IMPLEMENT DEMONSTRATION.

PLATE 86.- FIELD DAY AT BUNDABERG SUGAR EXPERIMENT STATION.
A Tour of Inspection under the direction of Mr. H. T. Easterby. Canegrowers on the march.

Other Insect Pests.

The remarks already inserted under this heading in the first part of this report also apply here. However, the Tenebrionid beetle mentioned, though common enough, was not found so plentiful as at Homebush. On the other hand, probably because of the greater quantity of Badila grown here, the Leaf Hoppers were far more plentiful than in the Mackay districts. The many unclassified plant bugs, Thrips, minute Centipedes and Millipedes, worms, and mites of sugar-cane, common to other districts were equally well represented here. The large Moth Borer is responsible for rather serious damage in fields on both sides of the river. This caterpillar seems to be very versatile in its selection of varieties, as was noticed on Mr. G. S. McKersie's farm at Airedale. The following varieties were found to have been attacked:—Java 247, Striped Singapore, H. 146, Tableland Badila, Hybrid No. 1, N.G. 24 B (Green Goru), Rappoe, Q. 813. As I have already reported, I have found it also in such very hard varieties as Uba. H. 146 is noted for its very hard rind, which renders it comparatively immune to the beetle borer. However, the damage done by this moth borer was almost as bad in hard varieties as in soft ones. It has a habit of entering the stalk somewhere near the node, sometimes through a bud, and then it works its way up or down the stick aimlessly until it has eaten sufficient food, at which time it will pupate. Sometimes the caterpillar will wedge itself below a leaf sheath and gnaw great gaping holes in the side of the stick. The result of all this damage is that the stick tends to shoot up at the lower eyes, and very often snaps. As the worst infestations are always found near dirty headlands, it would seem that clean cultivation is the best preventive against this pest. I cut up a great many bored sticks in different parts of the district and dissected about thirty caterpillars in search of parasites, but could not find any.

One grower at Home Hill reported having found a Longicorn grub 2 inches in length in a stick of Badila Plant. We were unable to find any more.

The Army Worm (*Cirphis unipuncta*) was found doing slight damage to Green Goru in the Clare locality, near Ayr.

Wallabies.

Wallabies do not appear to be such a serious pest here as in most of the other districts visited. However, the following method of poisoning tried by Mr. C. G. Munro, of the Home Hill State Farm, was found successful by him. The method applies only to cases where the wallabies follow regular "pads." The poisoning is carried out at night, and neighbours should be notified so that they may chain up their dogs and avoid poisoning them as well as the wallabies. A sugar bag is steeped in molasses and hung across the "pad" at a height calculated to cause the wallaby to brush its nose in the molasses. Some cyanide of potassium is previously mixed with molasses in a shallow tin and planted in the cane which is being attacked. According to Mr. Munro, the wallaby will invariably take the bait once it has had a taste of molasses from the bag. He finds that if the poisoning is tried directly and without the bag results are always very poor in comparison to those achieved with the aid of the bag.

Two instances of damage to cane by Native Companions were mentioned to me, at Airedale and at Home Hill.

Cane Stunting Weed.

This weed is of the same genus as that found at Carmilla and possibly is the same species. However, it grows to a much bigger size and is of a drooping rather than an erect habit, while its flowers are a very light pink instead of a light blue or lilac. Its effects on the cane are very much the same as those described in my last report in connection with the Carmilla weed, and to a certain extent its influence on the cane is even stronger, as one single small plant is sufficient to cause the older leaves to droop unnaturally. Where the weed is thick the cane is invariably greatly stunted. The trash clings to the stick, the older leaves droop long before they have died, and the young leaves of the "top" are short (about 9 inches to 10 inches) and narrow (about $\frac{3}{4}$ inch) even on comparatively tall sticks. Below the trash on these taller sticks is found a thick mat of aerial roots, and at this time of the year at least some of the eyes are seen to be growing vigorously.

The weed was found in a small patch of a few square yards in a field of Clark's Seedling belonging to Mr. P. King, near Inkerman Mill. As a result of my observations at Carmilla, I was very much inclined to doubt the stunting properties of this weed, but finding this weed in almost identical circumstances at Home Hill would seem to justify the convictions of the Carmilla growers as to its poisonous properties. However, the weed is a delicate one, and no difficulty should be experienced in keeping it out of cane fields.

PLATE 87.—NATURE UNLIMITED—SPEEDING THE PLOUGH, BUNDABERG SUGAR EXPERIMENT STATION.

PLATE 88.—A SECTION OF THE CAR PARK AT THE STATION

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received from the Entomologist at Meringa (Mr. Edmund Jarvis) the following report, under date 30th May:—

Aphides Attacking Sugar-cane.

An interesting outbreak of the common Plant Louse, *Aphis sacchari*, occurred in the Babinda area towards the middle of March, small patches of varying extent being affected on several canefields bordering the Russell River.

This insect was first noticed by the writer on cane leaves close to the Mulgrave River in 1914, and has been long known as a pest of this crop in Java and elsewhere (*see* Bulletin No. 3 of this Bureau).

In Queensland, however, it is kept well in check by numerous parasitic and predaceous insects, so seldom does serious damage unless the increase of its enemies should happen to be adversely affected by abnormal weather conditions.

These aphides occur mostly on the under surface of the leaves of cane growing in low-lying situations.

Being only 1/16th of an inch in length and of much the same colour as the foliage, they usually escape notice, although congregating often in countless numbers, comprising specimens of tiny larvæ no bigger than the point of a pin, wingless viviparous females, nymphs with rudimentary wings, and winged insects of both sexes.

Aphides are known to increase abnormally during a prolonged spell of warm, dry weather.

The rainfall for March and April this year has been one-third less than the usual amount for that period; while the average shade temperature during these months has been 78.49 deg. Fahr., as against that of 75.57 deg. Fahr. for March and April of 1923.

Possibly these differences in rainfall and temperature may be responsible in part for the present outbreak.

Sooty Fungus on Cane Leaves.

About 10th April I was advised that the leaves of some cane at Moolaba were turning black as though attacked by a fungus, which was said also to be checking the growth of the affected stools.

The trouble, as I expected, was found to be due in the first instance to the presence of *Aphis sacchari*, the blackening of leaves, however, being caused by a fungus (*capnodium* sp.) known commonly as "Smut," "Sooty Mould," "Fumagine," &c.

This organism is not parasitic, but merely grows on the surface of a sweetish secretion which is scattered freely over the leaves by aphides whilst sucking the sap.

Although of secondary importance, this fungus certainly retards plant growth by shutting out light from the cells, choking the stomata or breathing pores of the leaf, and interfering with the natural escape of watery vapour, &c.

Fortunately, by the end of April—most of the aphides having been then destroyed by various enemies—rain had commenced to loosen and wash this fungus and honey-dew from the foliage, giving stunted stools a chance to recover normal activity.

Additional species of Aphidiidæ recorded by the writer in 1916 as affecting cane at Gordonvale and Meringa include a large, globose, dull-yellow aphis, noticed during late winter and early spring months clustered in small colonies on the basal portion of underground shoots or buds of sets planted about 4 inches deep; and a slender pale-green species suffused with bluish-grey on head and prothorax attacking the leaves; both these aphides being, however, of minor economic interest (*see* Bulletin No. 3 of this Bureau).

Tachinid Parasites Emerging in Large Numbers.

The past few weeks have proved particularly favourable for the propagation of *Ceromasia sphenophori*. During the period 7th April to 10th May (five weeks) the average shade temperature in our breeding cages has been about 74.50 deg. Fahr., while only 6.44 inches of rain have fallen, and the days have been mostly cloudy, with frequent light showers, cool nights, and very little wind.

On 7th April ten cane sticks stocked with seventy borer grubs were put into a breeding-cage containing about sixty parasites, and just five weeks later flies commenced to emerge freely from these infected sticks. The cane used was half-grown sticks of Badila, stood as usual in moist soil, holes made for insertion of the larvæ being slightly plugged with fibre from broken up borer cocoons.

The abovementioned weather conditions are evidently ideal for the rearing of such parasites in confinement, since the canes used are able to retain their moisture, whereas under high temperatures a certain percentage that do not happen to root afresh are liable to become somewhat dry, and by shrinking slightly may affect normal development of the borer grubs.

Nearly 400 parasites appeared in the cage between the dates 10th to 15th May.

One hundred of these flies were forwarded at once to Macknade in order to help on the good work of breeding *Ceromasia sphenophori*, which is being carried on by the Colonial Sugar Refining Company at Macknade mill.

Grubs from the Herbert River.

Advantage will be taken of our visit to this district to procure samples of root-eating grubs of such cane-beetles as do not occur in our more northern plantations as cane pests, although present here in the season on the foliage of *Litsea ferruginea* and other food-plants. The species said to be injuring cane on the Herbert River will probably prove to be either *Anoplognathus punctulatus* or *A. smaragdinus*, the co-called "green beetle" of that district, which is collected during the flighting season and sold for about 2s. 6d. per quart.

Again, *Anoplognathus frenchi* may have to be reckoned with as being destructive to cane to a small degree. This species, together with *A. mastersi*, feeds on the foliage of plants that occur commonly on the banks of the river at Halifax and Macknade; both these beetles being very beautiful insects of a uniform metallic gold or golden-green colour. We hope to obtain sufficient living grubs of the above species to enable them to be reared through to the pupal and imago stages; and also acquire conclusive evidence as to which species, if any, attack cane roots in that district.

Fungus Attacking Cane Grubs.

As mentioned in Entomological Hints for this month (May), the Green Muscardine Fungus (*Metarrhizium anisopliae* (metsch.) Sor.) is in evidence at present in our canefields; a small percentage of third-stage grubs of *albohirtum* doubtless falling victims to this vegetable parasite.

One can now find either the mumified grubs entirely encrusted with green spore masses or lumps of soil about the size of a hen's egg bound together by fungus strands, which when broken open reveal the remains of a dead grub more or less intermingled with green spores of *Metarrhizium*.

This entomogenous, or insect-destroying fungus, has been recorded on many different hosts in other countries, including bettles, grasshoppers, froghoppers, digger-wasps, &c. In the Cairns district we have noticed it affecting the grubs of several species of scarabæidæ attacking sugar-cane, as well as the common Weevil Borer (*Rhabdocnemis obscurus* Boisd.), and killing larvæ and imagines of our digger-wasps (*Campsomeris tasmaniensis* and *C. radula*).

The possibilities of this fungus parasite as a controlling factor against the cane-borer are being investigated at present, and we hope to be able later to report favourably in this connection.

QUEENSLAND TREES.

No. 30.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

The species shown in our illustrations is *Cryptocarya patentinervis*. It does not appear to be known by a vernacular name. The trees attain a height of 80 feet and a stem diameter of 1 foot 9 inches. The bark is light grey or nearly white in colour, and the stem is not prominently buttressed at the base although strongly developed surface roots are often in evidence. The species is found as far south as the Hastings River, New South Wales (J. H. Maiden), and as far north as the Atherton Tableland.

Photo. by Authors.]

PLATE 89.—CRYPTOCARYA PATENTINERVIS.

A tree in the rain forest of Cedar Creek, westward from Eumundi.

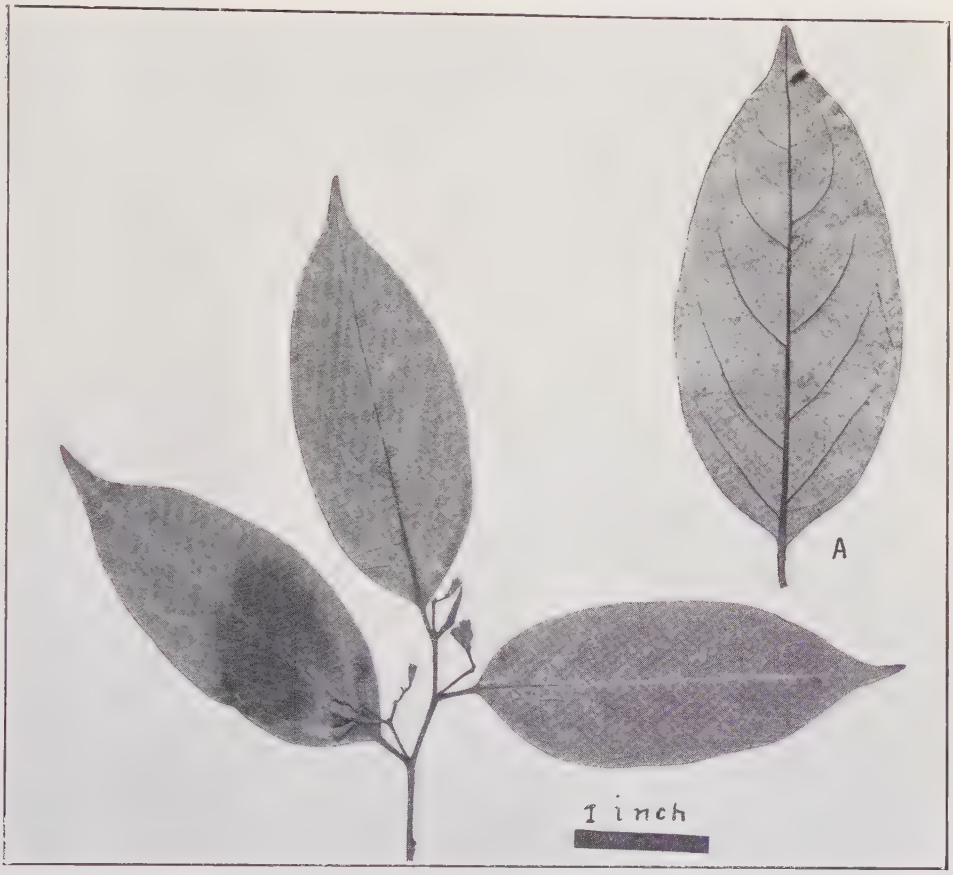
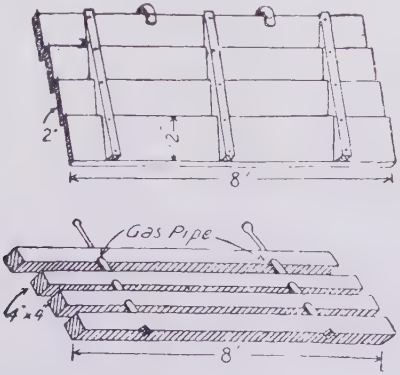


Photo.: Dept. of Agriculture and Stock.]

PLATE 90.—CRYPTOCARYA PATENTINERVIS.
A.—Showing underside of leaf.

TWO GOOD DRAGS.

Two kinds of drags are illustrated herewith. The common plank drag is probably best for all purposes. This should be made 8 feet long, using 2 inch by 12 inch hardwood boards, bound together as shown in the illustration. The other drag shown is made of 4 inch by 4 inch hardwood timbers, and is perhaps a better clod crusher than the plank drag, but it has the disadvantage of clogging in damp soil. The timbers are all run through with iron rods, short pieces of gas pipe being used to keep the timbers properly spaced.



AN UP-TO-DATE PIGGERY.

NEAT, USEFUL, AND ATTRACTIVE BUILDINGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The accompanying photographs illustrate an up-to-date piggery with neat, useful, and attractive buildings. It is the property of Mr. Fred Knuth, of Boonah, and is used principally as a fattening depôt for pigs fed on buttermilk (with the addition of some grain concentrate) secured from the Boonah Butter Factory.

The piggery consists of one central fattening house, containing eight pens each 20 feet by 12 feet, with a 3 feet 6 inches passage through the centre, the building material required includes some thirty-six round upright posts, beams, cross ties, and battens, the roof is of galvanised iron with ridge capping, spouting, &c. The pens are subdivided as required, the subdivision material being sawn hardwood rails and pickets (1½ inches apart) 3 feet 6 inches high. Wooden troughs have been used as it is found they are more satisfactory than concrete or brick and cement; they are 8 feet long by 12 or more inches across the top and are made V-shaped. When placed in position under the subdivision rail facing the passage there is just sufficient space allowed for the pigs to feed comfortably without standing or lying in the trough. The flooring is of bricks set in sand and grouted in with cement. This has proved far more satisfactory than a concrete floor, and has many other advantages apart from the convenience of handling in the first instance.

The floor slopes outwards from the centre of the building, and an open brick and cement drain outside the piggery conveys all waste water away from the building.

Each pen is provided with a gateway, the gates being placed in such a position that they fill a useful part when pigs are being moved from one pen to another. The ridge pole is approximately 14 feet from ground level, the wall plates about 6 feet 6 inches.

Four thousand bricks were required in laying out the floor, drains, &c., and Mr. Knuth estimated the total cost of the building, tanks, &c., at £1,000 (exclusive of cost of about one mile of 2-inch galvanised piping).

The buttermilk is conveyed for a distance of about 1 mile from the factory to the piggery through 2-inch galvanised piping and through 1½-inch galvanised piping from the receiving tanks to the sties. Very little trouble has been experienced with this piping ex the factory to the piggery as it is regularly flushed out with 400 gallons of hot water immediately after the buttermilk supply has been pumped through, but in the case of the 1½-inch pipes leading from the receiving tanks to the pig sties, and which frequently carry a supply of milk for many hours at a time, considerable trouble has resulted, and it is considered that the lifetime of these pipes is but five years. One plate illustrates a batch of pipes after five years' use; they were riddled with holes, the result of the action of the acid in the milk on the pipes. Mr. Knuth agreed that wood pipe would be much preferable, and the writer urges the use of properly constructed wood pipes for this purpose in preference to galvanised piping; it is considered also that it would be more economical and much more satisfactory for the conveyance of the milk from factory to piggery.

Mr. Knuth has been working this property for eighteen years and reports very little trouble with his pigs from contagious diseases, heat, apolexy, or other troubles.

The milk storage tanks comprise two sets, one of galvanised iron with a 1½-inch concrete lining inside, the other set is of ordinary ship's tanks, each of 400 gallons capacity. The large tank is used for the water supply, it also has a 1½-inch inside lining of concrete.

In the illustration will be seen the loading race, leading from the central passage, and per means of which the pigs are driven from the pens to the waggon for delivery to the pig truck.

PLATE 91.—PIG-FATTENING DEPÒT, PROPERTY OF MR. FRED KNUTH, BOONAH.
A neat, attractive, and convenient building.

PLATE 92.—MR. FRED KNATZ'S PIGGERY.
Note the effect of the buttermilk on the galvanised piping in the foreground. These pipes had been in use for five years when they had to be replaced with new piping.

PIG BREEDING.

THE LAWS OF BREEDING AS THEY APPLY TO THE PRODUCTION OF IMPROVED TYPES OF PIGS.

By E. J. SHELTON H.D.A., Instructor in Pig Raising.

It should be the aim of every breeder of live stock to improve the different types of animals with which he farms. Technically speaking, animal breeding is that science which deals with the reproduction and improvement of domestic stock. It is both a science and an art; and to be successful in his business the farmer, like the storekeeper, the butcher, the baker, &c., must have a thorough knowledge of the details—the A B C—of his job. He must have a definite objective and must devote both time and money to working out his plan. Professor Elwood Mead suggests as a practical slogan for the farmer that he should—

"First plan your work,
Then work your plan."

The principal aim in breeding should be to improve the animals in those qualities which have a definite commercial value—in pigs, the development of an early maturing marketable carcass and the reproduction of better and more numerous progeny—in cattle the objective is milk or beef; in sheep, wool, mutton, and lambs; in horses, speed and labour; in poultry, eggs and flesh, &c. In general it will be found that the better type of animal will always have a much more striking and attractive appearance; he will be more symmetrical and possess beauty of form and distinctive character. The most valuable of the improved types are those that return the greatest value in the commercial product for which they are bred and fed (whether it be meat, milk, wool, speed, or labour) from the least amount of food, in the quickest time, and with the least possible waste. It is upon these several characteristics that we assess an animal's value, and an improved value will always be secured for the animal that gives the maximum profit at a minimum of cost. It must, of course, be remembered that, other things being equal, the best results will be obtained from animals that consume the most food in proportion to their live weight. No good will result from stinting the food; we have to increase the consuming capacity in order to obtain a corresponding increase in the production.

The First Great Law of Breeding.

It is an axiom of breeding that "like produces like," therefore the greater the percentage of good (desirable) points the parents possess in common, the more likely they are to be able to reproduce these good points in their offspring. It is not to be expected that the progeny of good reliable sires and inferior unreliable dams will inherit all the good points of the sire to the total exclusion of the bad points of the dam, for the last-mentioned are just as readily reproduced (and often more frequently) than the good ones.

Success in pig breeding requires not only careful attention to these matters, but they must also be encouraged by grazing the animals on good succulent pasture and supplementing this pasture with nutritious, easily digested and assimilated, concentrated food. The intelligence that has been used in his breeding has raised the pig from the plane of the veriest savage to that of a most useful and valuable farm animal, contributing a great variety of edible meats, amongst them some of the most toothsome delicacies, as well as several very valuable inedible commercial products. His disposition has been changed considerably, his shape moulded to types affording a marvellous yield of pork and of by-products; and by domestication and careful selection and breeding for early maturity and quick fattening he has been brought to a standard of excellence hardly dreamed of by his earliest improvers. There is always a best breed, and this is the breed that best suits the owner's purpose. There are, of course, many characteristics that go to make up the "best" just as there are many inferior qualities that should be eliminated. There are certain fundamental principles and laws in breeding of which the farmer would do well to make himself the master. They are of the utmost importance, and a study of them should prove of interest.

The first great law, and by no means the least important, is the one already referred to and commonly known as the "law of heredity" or the law that "like produces like." It sometimes happens that this gives place to the second law, which we know as the law of variation, or "like does not always produce like," and, finally, we have ever present the tendency to revert to the original type or ancestral strain. This is known as the "law of reversion." The first law is the commonest law of life, and is easily understood—Berkshire produces Berkshire, black produces black,

and white produces white. Under the law of variation, however, there is a decided tendency in all animals to produce characteristics that differ from those of the parental type (the parents). These variations may be caused by changes of food, climate, environment, or habit. The law is understood to vary or lessen in its intensity and intrusion with increased purity of blood. In the law of reversion, also known as the "law of atavism" (the third law), we have an innate or inherent tendency in all domestic animals to revert (or go back) to the original type or ancestral strain, and this may trace back several generations (a point breeders frequently overlook in selecting inferior types). Berkshire pigs frequently "throw back" to white spotted or even to "rusty brown" types. The writer has heard breeders many times blame red soil for the appearance of a rusty brown tinge in the hair of their Berkshires; but this is not so; it is a definite tendency to revert, which should be carefully noted, and types showing this tendency should be rigorously culled irrespective of their value—that, of course, especially if they are being utilised as stud stock or are being sold as "purebred" pigs.

The Art in Breeding.

The art in breeding, then, consists of the selection of males and females intended to breed together, with a studious reference to both their merits and their defects, carefully avoiding those with a tendency to defects which may preponderate in the progeny.

We must also learn to observe the smallest imperfections in the parents, for the breeder's success depends on his talent and ability to detect these. Special care must also be given to noting defects in the ancestors, if it is at all possible to inspect and study them. One great writer says that the prevention of free crossing and the intentional matching of individual animals are the "corner stones" of a breeder's success.

The Principles of Breeding.

To practise the theory of breeding we must understand these general principles and aim at certain special features.

First, "To breed only a real or ideal standard of excellence (this is most important, as on it depends much of the success it is possible to attain)."

Second, "To breed only from parents that most closely approximate to this standard (*i.e.*, such pigs as are eligible for registration by reason of their trueness to the standard type, &c.)"; and third, "To breed only from parents—more particularly males—that have long been bred from pure stock without admixture of alien or mongrel blood."

The obscure features in breeding relate to variation, and these we usually include in the second law. It has been observed that the purer the blood the less likelihood there is of variation from the true type. Variation has been useful in that fresh forms of domestic animals have been evolved through its agency. These, when of advantage, and if carefully handled, might be rendered permanent in type. It is possible also to cause artificial variation. This has been a great boon to and is being largely availed of in the breeding of poultry and pigeons and in the horticultural world (in sweet peas and flowers of various descriptions).

Why Animals Revert or Throw Back.

The law of reversion or "atavism" is invariably present in the progeny of mongrel stock, such as in wild pigs whose breeding has not been guided along any special line. This reversion may, and indeed often does, go back to the types of several generations past. Bakewell, the original improver of domestic stock, associated breed with utility of form, good quality of flesh, and early maturity. His supposed secret (for it was supposed that he possessed some mysterious power in his day, which would probably have been worth a fortune to him had he been a dishonest man) was simply the mating of animals possessing the greatest number of the above qualities. These he blended when he found them to be productive of an improved type; he then practised in-breeding and line breeding to maintain the desired characteristics. This was more necessary in his day than at the present time, for he had not the variety of strains to work on, nor could he obtain unrelated blood, sufficiently improved, to introduce into his herds.

Fancy Points.

Fancy points or striking characteristics in the purebred animal are indications of purity of type, and when associated with a strong constitution they give to the animal a much greater commercial value. Such points usually relate to colour markings,

symmetry of form, shape of ears, &c. Berkshire pigs have the characteristic markings —four white feet, a white splash on the face, and a white flag on the tail. Poland-Chinas have a peculiarly attractive pair of small lopped ears and a rounded body. The Yorkshire pigs are pure white; the Tamworths a golden red colour, &c., &c. It will be seen, therefore, that the breeding of pedigree stock is something more than "child's play." The studmaster of to-day must be just as much an expert in his profession, if he is to succeed, as the professional man in his city office. Unfortunately, all too few farmers understand this, and they find it difficult to realise that an animal's value is based on something more than mere appearance or fancy markings. There is no reason in the world why a high-class pedigreed boar or sow should not be worth equally as much as a stud sire or dam in any other type of stock. The breeders of stud sheep think nothing of paying up to 1,000 guineas or more for a selected ram; pedigreed bulls have been sold at equally high figures, whilst other stock frequently also realise high figures. Let us hope the day is not far distant when it will actually pay to breed high-class pigs, and when it will be possible to secure as much as three figures for a really choice boar or sow. In England and in America in recent years some exceedingly high figures have been paid for selected boars and sows, and it is high time breeders here awoke to a realisation that these are not "faked" values. It is, on the other hand, gratifying to note that our leading breeders have been playing a most important part in the production of purebred animals, though, in comparison with Victoria and New South Wales, the number of stud-pig breeders in Queensland is very limited.

In Australia we have become accustomed to look upon animals coming from other countries—*i.e.*, from Great Britain, the United States of America, and Canada, and also from New Zealand, &c.—as representing the most up-to-date types. Seeing, then, that we have been importing stock from these countries for a number of years, it is not surprising to note that some of the animals produced here are equal, if not superior, to their imported parents. This indicates that our leading studmasters have learnt something of the art in breeding, and this, backed up by favourable climatic conditions and environment, has done much to popularise the breeding of stud stock.

Unfortunately, in so far as the stud pig business is concerned, we have not yet been able to build up an export trade to overseas ports; our interstate trade, too, has learnt something of the art in breeding, and this, backed up by favourable climatic shipping space, &c.; but, in face of these and other drawbacks, some very satisfactory sales have been reported.

An interchange of blood would be of very great value if breeders could be depended upon to supply nothing but the best and truest types, free from blemishes such as would make them ineligible to compete on even terms with the best in either State or country. There is no reason why a lucrative trade should not spring up between such countries as New South Wales, Queensland, and New Zealand, or even with the other sister States of the Commonwealth, particularly in view of the fact that the general embargo against the introduction of stud pigs from Great Britain is not likely to be lifted for any great length of time, at least for two or three years, and the added disadvantage of heavy transport charges between Great Britain and Canada and Australia have to be considered.

TETANUS.

Tetanus is an infectious disease due to the presence in the tissues of a micro-organism, the Bacillus Tetani. This organism is fairly widely distributed, though the disease appears more frequently in certain areas. The organism is highly resistant to climatic conditions and can exist in a dormant state for lengthy periods.

Infection is usually by a minor wound, particularly in the region of the feet. The incubatory period is a fairly long one, ten to fifteen days generally elapsing between the time of infection and the appearance of the characteristic symptoms. For this reason the wound through which the organism entered the tissues is often overlooked.

The organism multiplies rapidly in the tissue once it has become active, and during the process of multiplication poisonous toxins are produced which cause a well-marked stimulation of the nervous system.

The symptoms of tetanus are—protrusion of the membrane at the inner angle of the eye, especially when the muzzle is raised, the head is extended, ears pricked forward, muscles of the neck and rump hard and tense, tail slightly elevated and drawn a little to one side, and the muscles of the limbs in a state of tension. Owing

to this latter condition the animal moves in a stiff, constrained manner, and if he should go down has great difficulty in regaining the standing position. In the earlier stages the jaws are rarely clenched, but as the disease progresses this symptom becomes more pronounced, hence the common term "lockjaw."

Medicinal treatment has proved of little value in this disease. With careful nursing about 30 per cent. of cases will recover. Owing to the irritated condition of the nervous system, the slightest noise or excitement is sufficient to bring on a convulsion; therefore the first step is to place the animal in a dark stall and to plug the ears with cotton wool. It is also advisable to build a strong frame around the animal about 3 ft. 6 in. high against which he can rest, and which will prevent him lying down. In the earlier stage, before the jaws are clenched, a plentiful supply of soft food should be given. Later on food must be in the nature of watery gruels.

A full supply of fresh drinking water should be kept in such a position that he can immerse the muzzle above the angle of the lips.

Animals which are alive twelve to fifteen days after the first symptoms appear will usually recover, but they should be kept in the narrow stall until the limbs become flexible.

Laxative medicines, such as Epsom salts, should be given in the drinking water—about 2 oz. per day.

An anti-tetanic serum is procurable which acts very satisfactorily as a preventive, and in large doses has marked curative value, but this treatment should only be used under the directions of a qualified veterinary surgeon.

If the seat of infection can be located, thorough sterilisation is of benefit, though occasionally the process brings on tetanic convulsions.—Major A. J. McKenzie, Govt. Vet. Officer.

MILKING RECORDS, COLLEGE DAIRY HERD, APRIL, 1924.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Butter.	Remarks.
			Lb.	%	Lb.	
College Mignon ..	Jersey ..	24 Mar., 1924	690	4·9	39·30	
Iron Pl te ..	,,	3 Mar., 1924	690	4·8	39·00	
College Cobalt ..	,,	14 Sept., 1923	630	4·6	33·90	
College Sunrise ..	,,	3 Jan., 1924	600	4·5	31·80	
College Prima Donna	Friesian	9 April, 1924	572	4·6	30·80	
College Meadow Sweet	,,	17 Mar., 1924	660	4·0	30·60	
College Wild-flower	Jersey ..	13 Aug., 1923	510	4·8	28·80	
Netherton Belle	Ayrshire	30 Oct., 1923	570	4·3	28·50	
Dawn of Warra-gaburra	Jersey ..	10 Oct., 1923	450	5·1	27·00	
Bellona	Ayrshire	3 Aug., 1923	510	4·5	26·86	
Magnet's Leda ..	Jersey ..	18 Aug., 1923	410	4·6	25·80	
Hedges Nattie ..	Friesian	21 Nov., 1923	480	4·5	25·50	
Myrtle Blossom	Ayrshire	9 Mar., 1924	832	3·6	24·84	
College Meadow Queen	Friesian	10 Jan., 1924	540	3·8	24·00	
Buttercup ..	Shorthorn	7 Sept., 1923	570	3·6	23·70	
Miss Betty ..	Jersey ..	30 Oct., 1923	450	4·5	23·70	
Hedges Madge ..	Friesian	18 Aug., 1923	510	3·9	23·40	
Songstress ..	Ayrshire	22 Aug., 1923	480	4·0	22 80	
College Promise	Jersey ..	14 Aug., 1923	420	4·6	22·50	
Fair Lassie ..	Ayrshire	23 Nov., 1923	480	3·9	21·90	
Miss Fearless ..	,,	17 Nov., 1923	510	3·6	21·30	
Yarraview Snow-drop	Guernsey	7 Sept., 1923	330	5·2	20·10	
College Hope ..	Jersey ..	21 Oct., 1923	360	4·8	20·10	

MOUNT GRAVATT EGG-LAYING COMPETITION.

REPORT FOR APRIL, 1924.

The test commenced as advertised on the 3rd April, therefore the records are two days short of the month. Many birds were laying on their arrival, but owing to change of conditions the general egg yield decreased until the 16th instant, but since that date a notable daily improvement has been made. The average per bird is 8.79. The following are the individual records:—

SECTION 1.

LIGHT BREEDS.

Competitors.	Breed.	A.	B.	C.	D.	E.	F.	Total.
W. and G. W. Hindes ..	White Leghorns ..	19	21	15	15	17	17	104
John J. McLachlan ..	Do. ..	19	19	16	12	14	20	100
Arch. A. Stirling	Anconas	18	17	21	14	13	16	99
Kidd Bros.	White Leghorns ..	19	19	..	19	19	14	90
J. W. Cox	Do. ..	19	6	19	3	20	15	82
T. W. Honeywell	Do. ..	15	21	7	11	17	11	82
W. D. Melrose	Do. ..	19	19	14	4	21	1	78
S. Grenier	Do. ..	12	13	5	16	18	13	77
W. Wakefield	Do. ..	1	9	17	15	17	18	77
H. P. Britten	Do. ..	12	20	10	12	13	1	68
Mrs. R. E. Hodge	Do. ..	17	17	..	18	14	..	66
W. E. Woodward	Do. ..	4	19	13	1	15	14	66
H. Fraser	Do. ..	11	18	5	10	3	13	60
L. J. Selman	Do. ..	16	6	12	15	8	3	60
T. W. Biddulph	Do. ..	17	10	3	9	5	12	56
W. H. Flowers	Do. ..	10	..	11	1	17	16	55
Chris. A. Goos	Do. ..	3	8	17	19	..	5	52
B. Driver	Do. ..	16	3	4	20	8	..	51
R. C. J. Turner	Do. ..	14	16	1	1	..	19	51
D. McHardie	Anconas	8	9	6	13	3	10	49
Mrs. L. Anderson	White Leghorns ..	15	7	7	..	7	11	47
J. E. G. Purnell	Do. ..	15	3	3	10	5	7	43
Ancona Club, Pen 1 ..	Anconas	..	..	11	17	9	1	38
Arch. Neil	White Leghorns ..	6	15	1	11	..	5	38
L. Bird	Do. ..	13	6	7	2	3	..	31
J. W. Newton	Do. ..	4	3	8	1	8	7	31
Geo. Williams	Do. ..	13	..	2	..	12	..	27
T. H. Craige	Do. ..	6	3	3	1	..	8	21
J. Marks	Do. ..	20	..	1	..	..	..	21
Ancona Club, Pen 2 ..	Anconas	2	..	..	1	8	1	12
H. P. Clarke	White Leghorns ..	1	3	..	1	5	..	10

SECTION 2.

HEAVY BREEDS.

James Hutton	Black Orpingtons ..	17	23	18	7	22	14	101
James Potter	Do. ..	20	21	10	18	17	3	89
Kidd Bros.	Do. ..	7	2	18	20	20	13	80
H. M. Chaille	Do. ..	11	18	15	9	19	1	73
W. and G. W. Hindes ..	Do. ..	4	19	3	17	19	3	65
E. Walters	Do. ..	4	3	4	19	16	18	64
Mrs. A. Kent	Do. ..	10	13	2	8	4	16	53
F. W. Lenny	Do. ..	21	..	19	1	..	..	41
Carinya Poultry Farm ..	Do. ..	..	..	14	..	3	13	30
R. Burns	Do. ..	7	1	..	..	2	2	12
J. Ferguson	Do. ..	..	3	..	6	..	..	9
Mrs. A. E. Gallagher ..	Do. ..	2	3	..	..	3	..	8
H. G. Stevens	Do. ..	5	..	..	3	..	..	8
E. C. Stead	Silver Wyandottes ..	..	..	..	..	..	..	..

P. RUMBALL, Supervisor.

MOUNT GRAVATT EGG-LAYING COMPETITION—*continued.*

REPORT FOR MAY, 1924.

During the past month the laying has been satisfactory, the average being 14·95 eggs per bird. The following are the individual records:—

SECTION 1.

LIGHT BREEDS.

Competitors.	Breed.	A.	B.	C.	D.	E.	F.	Total.
W. and G. W. Hindes ..	White Leghorns ..	42	40	26	36	36	35	215
Kidd Bros.	Do. ..	41	39	20	40	36	33	209
Arch. A. Stirling	Anconas	32	36	42	32	25	32	199
G. W. Cox	White Leghorns ..	36	24	41	19	42	36	198
Oakleigh Poultry Farm ..	Do. ..	26	41	31	20	37	36	191
John J. McLachlan ..	Do. ..	41	40	38	18	23	5*	194
H. T. Britton	Do. ..	29	43	33	32	36	17	190
W. H. Flowers	Do. ..	33	21	36	19	42	39	190
W. Wakefie'd	Do. ..	1	31	38	30	39	42	181
W. D. Melrose	Do. ..	12*	36	39	27	44	1	178
T. W. Honeywill	Do. ..	34	43	29	20	36	19	181
H. Fraser	Do. ..	34	39	16	35	18	34	176
S. Grenier	Do. ..	13	24	27	31	35	35	165
J. E. G. Purnell	Do. ..	34	19	21	30	26	30	160
Chris. A. Goos	Do. ..	3	32	37	40	19	27	158
R. C. J. Turner	Do. ..	35	34	13	23	10	43	158
Mrs. R. E. Hodge	Do. ..	40	36	17	38	18	8	157
T. W. Biddulph	Do. ..	38	31	3	28	19	31	150
L. J. Silman	Do. ..	36	27	29	18	24	9	143
T. H. Craig	Do. ..	26	21	23	21	12	34	137
L. Bird	Do. ..	37	28	27	2	25	15	134
Mrs. L. Anderson	Do. ..	34	15	18	7	30	30	134
Arch. A. Niel	Do. ..	29	35	6	30	12	13	125
W. McHardie	Anconas	23	21	7	26	17	26	120
J. W. Newton	White Leghorns ..	27	21	18	9	27	9	111
B. Driver	Do. ..	17	3	4	41	25	11	101
G. Marks	Do. ..	41	15	21	2	7	10	96
G. Williams	Do. ..	27	23	10	15	20	..	95
H. P. Clarke	Do. ..	4	22	18	20	21	8	93
Ancona Club, Pen 2 ..	Do. ..	18	9	5	19	22	7	80
Ancona Club, Pen 1 ..	Do. ..	4	..	24	29	19	1	77

SECTION 2.

HEAVY BREEDS.

James Potter	Black Orpingtons ..	41	45	35	40	38	27	226
James Hutton	Do. ..	26	46	40	21	46	37	216
H. M. Chaille	Do. ..	22	34	34	30	41	17	178
Kidd Bros.	Do. ..	29	12	34	26	41	30	172
Carinya Poultry Farm ..	Do. ..	22	5	35	21	26	34	143
E. Walters	Do. ..	5	5	4	45	42	36	137
Mrs. A. Kent	Do. ..	30	34	5	21	6	33	129
W. and G. W. Hindes ..	Do. ..	4	27	9	28	43	6	117
F. W. Lenny	Do. ..	35	2	41	13	6	15	112
R. Burns	Do. ..	25	15	17	15	7	7	86
Mrs. A. E. Gallagher ..	Do. ..	6	28	10	9	17	9	79
J. Ferguson	Do. ..	..	22	11	27	2	1	63
H. G. Stevens	Do. ..	6	7	..	19	1	16	49
E. J. Stead	Wyandottes	..	10	..	..	..	..	10

* Indicates that the score is for a replaced bird.

P. RUMBALL, Supervisor.

General Notes.

Rural Queensland on the Films.

The Acting Premier and Minister for Agriculture (Hon. W. N. Gillies) referring to the moving pictures prepared by the Department of Agriculture and Stock said, in the course of a recent Press statement, that the intention in undertaking the work was to familiarise townspeople here and in Great Britain with different aspects of country life and thereby stimulate interest in rural occupations. To carry this project into effect, it is proposed to send copies of films as they are completed to the Agent-General, in order that arrangements may be made for bringing the actualities of country life in this State before the people of Great Britain. That those who are inclined to emigrate to Queensland as agriculturists may quite understand rural conditions here is also one of the objects of their release abroad. It is also proposed to arrange with companies controlling films produced at the picture shows in Australia for the presentation of them to the Australian public.

Of the films shown at the trial presentation at the Royal Geographical Society's room at Brisbane on 27th May the films showing the last exhibition and the wool and sugar industries are practically complete, but the cotton picture is as yet unfinished. The excellent film depicting the cotton Pink Bool Worm and Weevil was prepared by the Department of Agriculture in the United States, and was secured for use here by Mr. Randolph Bedford, M.L.A., in the course of a recent visit to America. This film when exhibited in the cotton-growing areas should be of the utmost value in bringing home to growers the great danger that industry must expect if fields are not kept clean.

When this work was commenced it was intended that the films should be first used at the Wembley Exhibition, and they will still be offered for that purpose, but under the arrangements made, the Australian Exhibit there is staged as a whole and Queensland has no separate court. The central committee, when preparing for the British Empire Exhibition, included a diorama covering the whole of Australia, but the pictures taken cannot be so complete in detail because those who had control of the work were not able to have the advantage of following an industry through a whole season.

Maize Board Nominations.

The following nominations have been received for appointment to the Maize Board, to act for one year from the 1st August next, should the voting be in favour of the establishment of a Maize Pool:—

District No. 1, comprising the Pastoral District of Moreton (two representatives)—

David Charles Pryce, Toogoolawah;
Thomas C. Hayes, Laidley;
Thomas F. Plunkett, Beaudesert.

District No. 2, comprising the Pastoral Districts of Darling Downs and Maranoa (two representatives)—

Thomas Keys, Taylor;
William H. Strohfeldt, Wyreema;
John T. Chamberlin, Kingsthorpe;
George Burton, Cambooya.

District No. 3, comprising the rest of Queensland, with the exception of the Petty Sessions Districts of Atherton, Herberton, and Chillagoe (one representative)—

James H. Sigley, Kingaroy;
Hubert T. Horne, Coolabunia.

Messrs. Plunkett, Hayes, Kirkegaard, Chamberlin, and Sigley, together with a representative from the Council of Agriculture, have been provisionally appointed to act until the 31st July, and thereafter the Board appointed by the growers will act for one year from the dates of their respective appointment. The Provisional Board will act only in the event of an affirmative vote for the Pool.

Cheese Board.

A recent "Gazette" notifies that it is the intention of the Governor, in pursuance of the provisions of the Primary Products Pools Acts, to create a Cheese Pool and to constitute a Board in relation thereto. This Pool, which has been recomended by the Council of Agriculture, if formed, will include cheese produced in Queensland from the 1st July, 1924, until the 30th June, 1927. The Board to administer the Pool will consist of five persons, together with a person to represent the Council of Agriculture.

Provision is made whereby the present agents will carry on the disposal of cheese, under the direction of the proposed Board, until a date to be notified in the "Government Gazette." Until that date, on Monday in every week, every producer shall deliver to the Board a return showing the total quantities of cheese manufactured by him during the preceding seven days, the names and addresses of the persons to whom the cheese was consigned, and the respective quantities of cheese delivered to such persons, while an agent for the sale of cheese shall deliver a similar return to the above, with regard to cheese sold or agreed to be sold by him on behalf of any person during the last preceding seven days. Provision is also made for the internal adjustment, by the Board, of sales of cheese by producers and their agents.

The Minister may from time to time appoint any person or persons to inspect books and other documents of any producer or agent of a producer, for the purpose of ascertaining or verifying any of the particulars prescribed to be included in any return.

Provision is also made for the licensing of agents or dealers in cheese.

The Board shall have full control for regulating the delivery of cheese and the relative prices according to grade.

Persons eligible to vote on any referendum or election in connection with the said Board, prior to the 30th June, 1924, shall be persons, partnerships, firms, or bodies of persons, corporate or incorporate, who, at any time during the period from the 1st June, 1924, to the date of such referendum or election, produced or produce cheese for sale, and dairy farmers who, at any time during the abovementioned period, supplied or supply milk to a cheese factory.

Persons entitled to vote at any subsequent referendum or election in connection with the Board shall be persons, partnerships, &c. (as above), who, at any time during the six months immediately prior to the date of such referendum or election, produced or produce cheese for sale, and dairy farmers who, during such period, supplied or supply milk to a cheese factory.

Any petition for a poll to decide whether the above Order shall be made must be signed by at least fifty cheese producers or dairy farmers supplying milk to a cheese factory, and must reach the Minister before the 25th June, 1924.

To ensure their names being on the roll of persons eligible to vote, dairy farmers who have supplied milk to a cheese factory at any time since the 1st January, 1924, are invited to send their names and addresses and factories supplied at once, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Wednesday, 11th June, 1924, was fixed as the date for receipt of nominations for the election as growers' representatives on the proposed Cheese Board, the number of representatives to be elected being five.

The object of the proposed Pool is simply to extend the existing Cheese Pool, which has now been in operation since 1921, but expires by effluxion of time on the 30th June, 1924.

Animal and Bird Sanctuaries.

In accordance with the provisions of "*The Animals and Birds Act of* 1921," the following lands have been declared sanctuaries in which it is unlawful for any person to take or kill any animal or bird:—

1. Back Creek Gorge, Beechmont, parish of Witheren.
2. The Upper Valleys of the Coomera and Canungra Creeks, and Cainbable Mountain, along the extreme northern boundary of the National Park, including the undermentioned:—

   Portions 33, 23, 13, 55v, 56v, and 64v, parish of Witheren;
   Portions 15v, 16v, and 17v, parish of Roberts;
   Portion 7v, parish of Sarabah;
   Reserve for State Forest (R. 536), parish of Sarabah; and
   Portions 21v and 25v, parish of Kerry.

The Southern Queensland Fruitgrowers' Society.

The Southern Queensland Fruitgrowers' Society, Brisbane, has been declared to be a company carrying on operations of a co-operative nature in accordance with "*The Primary Producers' Co-operative Associations Act of* 1923," and the date of meeting of such society has been fixed as Friday, the 6th June, 1924.

The Recent Sydney Conference of Ministers of Agriculture—Tribute to Mr. Gillies.

Thus the "Australian Farming Journal," 16th May, 1924:—"Of the four Ministerial representatives, while Mr. Chaffey, as Chairman, showed a commendable grasp of most of the subjects submitted for discussion, there can be little doubt but that Mr. Gillies, who is acting as Premier of Queensland, with the almost certain reversion to the position on Mr. Theodore's retirement from State politics, dominated the Conference with his forceful personality. Into some of the resolutions he infused a spirit of definiteness and progressiveness that was previously lacking, and there was no doubting his overmastering desire to see the other States adopt the State-assisted policy of organising the farmers on a commodity basis."

Staff Changes and Appointments.

Mr. H. M. Begbie has been appointed a Member of the Cloncurry Dingo Board, *vice* Mr. H. McMaster, resigned, and the Police Magistrate has been appointed Government Representative on that Board.

In connection with the Bunchy Top Investigation now being conducted under the auspices of the Commonwealth, New South Wales, and Queensland Governments, Mr. C. J. P. Magee has been appointed as Assistant Plant Pathologist, with headquarters at Coolangatta.

Mr. Henry Collard has been appointed Assistant Instructor in Fruit Culture, as from the 1st April, 1924, and has been seconded for duty as Horticulturist in connection with the Bunchy Top Investigation.

Mr. F. G. Palethorpe, who held the position of Acting Inspector of Stock at Boondooma, has now been appointed a Temporary Inspector of Stock, for a period of six months.

Messrs. F. L. Atherton and H. K. Goodwin have been appointed Members of the Burnett and Belyando Dingo Boards respectively.

Mr. G. W. Jackson has been appointed an Acting Inspector under and for the purposes of the Diseases in Plants Act.

Professor E. J. Goddard, B.A., D.Sc., of the Queensland University, has been appointed to supervise the investigations into the disease called Bunchy Top in bananas, in accordance with the arrangement with New South Wales and the Institute of Science and Industry as representing the Commonwealth Government.

Constable A. J. Logan, of Tallebudgera, has been appointed an Inspector of Slaughterhouses.

Following on the declaration of Back Creek Gorge, Beechmont, as a sanctuary under the Animals and Birds Act, the gentlemen under listed have been appointed officers under and for the purposes of the Act:—

R. C. G. Norris, T. Sharp, H. Mardsen, J. B. Cameron, J. S. Scott, and S. Collins, all of Beechmont.

The following have been appointed Cane Testers for the forthcoming sugar season at the Mills set out as under:—

Misses I. McGill, Invicta; and L. H. Fuller, Proserpine; Messrs. C. J. Boast, Farleigh; C. H. Jorgensen, Cattle Creek; J. C. D. Casey, Marian; H. Lambert, Pleystowe; R. J. Rollston, North Eton; P. J. Phelan, Palms; A. G. Kelly, Racecourse; Misses D. Marles, Plane Creek; and K. Fauth, Millaquin; Mr. P. H. Compton, Qunaba; Miss E. Christsen, Bingera; Mr. J. McFie, Gin Gin; Mrs. K. Dunton, Maryborough; Messrs. F. Jorss, Mount Bauple; and R. B. May, Moreton; Miss C. E. Rowe, Babinda; Mr. J. S. Pollard, Mulgrave; Miss M. T. Smith, Mourilyan; Messrs. J. Howard, South Johnstone; and H. B. Staples, Pioneer; Miss I. V. Palmer, Kalamia; Messrs. F. W. Trulson, Inkerman; and S. C. Bracey, Fairymead.

Messrs. H. A. Larsen and T. D. Cullen have been appointed Assistants to Cane Testers at South Johnstone and Inkerman Mills, respectively.

The appointment of Mr. Jas. Carew as Senior Field Assistant, Cotton Section, stationed at Maryborough, has now been confirmed as from the 2nd November, 1923.

Constables E. Bidner and R. A. Skinner, of Cecil Plains and Hopetoun, respectively, have been appointed Inspectors of Slaughter-houses.

Egg Board.

As a result of the recent election with regard to the Egg Board, the following have now been appointed as Members of the Board for the year from the 1st June, 1924, to the 31st May, 1925:—

Messrs. J. R. Wilson, Eudlo; R. A. Chapman, The Gap; M. H. Campbell, Albany Creek; H. M. Stevens, Lanefield; Jas. Hutton, Kingsthorpe; and H. H. Bentley (to represent the Council of Agriculture).

Mr. Bentley has also been appointed as Chairman of the Board.

Sugar Assessments.

In accordance with the provisions of "*The Sugar Experiment Stations Acts, 1900 to 1923*," assessments have been levied on every ton of sugar-cane received at the Plane Creek Sugar-works at the rate of 1d. per ton, at the Pioneer, Kalamia, Inkerman, and Invicta Sugar-works at the rate of ¼d. per ton, and at the Cattle Creek, Farleigh, Marian, North Eton, Palms, Pleystowe, and Racecourse Sugar-works at the rate of 1½d. per ton, for the purposes of the Plane Creek, Lower Burdekin, and Mackay Cane Pests Boards, respectively. These assessments are payable by the owners of the sugar-works in the first instance, and are for the purpose of enabling the districts mentioned to raise funds to deal with grubs and other pests affecting sugar-cane.

The Sugar Cultivation Act—An Additional Regulation.

An additional Regulation (17) has been approved under "*The Sugar Cultivation Act of 1913*," providing that every person having possession of a Certificate of Authority in accordance with the Act, or a Certificate of Exemption under the Regulations, shall, between the 1st January and the 31st March in each year, submit such certificate to the nearest Clerk of Petty Sessions, who will compare the finger-prints thereon with the finger prints of the holder of the certificate. If the Clerk of Petty Sessions is satisfied that the person submitting the certificate is not authorised to possess same, he shall impound such certificate and forward same to the Secretary for Agriculture and Stock for such action as he may deem fit. Any person guilty of any contravention of this Regulation shall be liable to a penalty not exceeding £10. Regulation 13 of this Act has been amended by substituting in lieu of paragraph (4) thereof a paragraph providing that any person who is the holder of a Certificate of Authority or Exemption under the Regulations, and who fails to produce and allow a copy to be taken of the said certificate, on the demand of any member of the Police Force, Police Magistrate, Clerk of Petty Sessions, or an officer of the Department of Agriculture and Stock, or anyone authorised in that behalf by the Secretary for Agriculture and Stock, shall be liable to a penalty not exceeding £50.

Queensland Fruit in the South—Faulty Packing.

The Acting Premier and Minister for Agriculture and Stock (Hon. W. N. Gillies) has received the following report from Mr. W. Rowlands, Fruit Marketing and Packing Instructor:—

"While in Melbourne and Sydney recently, my attention was drawn to the condition custard apples were arriving at their destination.

"When the cases were opened for my inspection the fruit was marked all over, and when displayed for sale in the shop windows did not look very inviting to the fruit-eating public, and prices fell accordingly. The cause of the marking is the fruit coming into continual contact with the sides of the cases and rubbing against each other. This marking could be overcome by packing in woodwool, and not allow the fruits to touch each other or the sides of the cases.

"One grower shipping custard apples to the South packed in woodwool is receiving 3s. to 4s. per case more than those arriving marked, and agents find it easy to dispose of this grower's fruit, whilst marked fruit is left on their hands. There is a good market for custard apples in both Sydney and Melbourne, but nice, clean fruit is wanted only.

"In reference to the packing of this fruit, there is no system of packing laid down owing to the shape of the fruit. I would suggest growers of custard apples to pack in woodwool and handle as carefully as possible, to enable agents to dispose of their fruit at much better prices, and at the same time secure a regular market in these cities."

The Wheat Pool Act.

A proclamation has been issued in pursuance of the provisions of "*The Wheat Pool Act of* 1920" extending the provisions of the Act to apply to wheat harvested during the season 1924-25.

Protection of Native Animal and Bird Life.

Owing to continual disregard of the provisions of the Animals and Birds Act in the Ingham District, Messrs. Jas. Allingham, F. H. Alston, H. G. Alston, E. Freeman, Chas. P. Ryan, Thos. Smith, junr., and N. S. C. Warren, all of Ingham, have been appointed Officers under and for the purposes of "*The Animals and Birds Act of* 1921."

Primary Producers' Organisation Act.

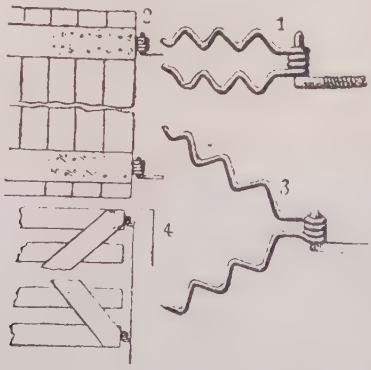
Under the Primary Producers' Organisation Act, clause 6 of the Schedule to the Act has been amended by deleting the second paragraph thereof, and substituting in lieu of same a paragraph providing that By-laws of District Councils or Local Producers' Associations shall be signed by the Chairman of the Council or Association and submitted to the Governor in Council for approval, and if approved by him, the same shall have the force of law.

Primary Products Pools Act—Additional Regulation.

An additional Regulation under "*The Primary Products Pools Acts*, 1922 to 1923" has been issued, providing that if the number of persons nominated or elected as Members of a Board to deal with any pool is less than the number proposed to be elected, the Minister for Agriculture may appoint such person or persons as he thinks fit to complete the number of persons required to be appointed to constitute the Board, and such person or persons shall be Members of the Board and have all the rights, duties, and obligations of a Member elected and appointed to the Board.

A CHEAP AND EFFICIENT HINGE.

The illustration represents a hinge made of a piece of stout wire, and well adapted for use on any cheap gate or on a door having battens which may enclose the corrugated shanks diverging from the eye of the hinge. The figures show different forms of the hinge and how it is applied, the wire being bent upon itself to form an eye or knuckle, in which the wire is closely coiled upon itself, while the



body members have a corrugated or serpentine form, with angular spurs at the end. The two members are located between the slats, crossbars, or braces of a gate, or are enclosed by the battens of a door, the means employed for securing the parts together also holding the members of the hinge in place, while the eye or knuckle extends outward and receives the ordinary knuckle pin attached to the swing post, or equivalent device in a door casing.

Answers to Correspondents.

Feeding Dairy Cows.

W.C.D. (Ringtail)—

The Director of Dairying, Mr. E. Graham, advises:—Maize may be fed with advantage to dairy cows in conjunction with other fodders, preferably those of a succulent nature. As the maize grain is naturally hard it is necessary that it be softened by soaking in water. It usually requires from eighteen to twenty-four hours to render the grain in a condition suitable for feeding to cows. Bran is slightly richer in protein than maize, 17 lb. of the former being equal to 19 lb. of the latter in protein content. Keeping in mind the slight advantage of bran over maize you should have no hesitancy in substituting maize for the bran in feeding. The correspondent does not state the amount of chaffed-up green corn stalks that are being fed, consequently it is not possible to advise as to the exact quantity of maize that would be necessary to provide a balanced ration.

Rosella Wine.

H.H.G. (Baffle Creek)—

Put your fruit into a cask that has one head out. Pour boiling water over the fruit, rather more than enough to cover it. Let this stand for about three days; stir now and again. At the end of three days strain the liquor into another cask, this cask to have both heads in. Then for every gallon of liquor take 3 lb. of sugar, and make a good thick syrup of same. Pour this syrup, while hot, into the liquor and stir well. Leave the cask with bung out until fermentation starts. Should this not occur, say, in twenty-four hours, add a bottle of yeast. Keep this cask in as even a temperature as possible as this will help the fermentation. In the process of fermentation you will lose some of your liquor. Should it ferment thoroughly, save the liquor which overflows from the bung hole and put it back into the cask, but should you find this not enough to keep your cask full, add a little warm water. When the liquor has almost finished fermenting, say, when it stands at 3 degrees density by the Saccharometer (Beaume's), bung up the cask and leave for three months. Then bottle.

The "Cruel" or "Painted Leaf" Plant *(Euphorbia heterophylla).*

E.K.W. (Warren)—

The Government Botanist (Mr. C. T. White, F.L.S.) advises:—

The specimen sent with your letter of the 24th ultimo is *Euphorbia heterophylla*, commonly known as the Painted Leaf or Cruel Plant. It is a native of the warmer parts of the United States and of Tropical America, but is now widely spread over most warm countries. It is a very close ally of the Poinsetta so commonly grown in Queensland gardens. The milky juice is irritant and will blister the skin. If eaten by stock it has a like effect on inner membranes and will make the animals very sick. It is reported that honey gathered from the flowers is acrid, emetic, and unfit for human food.

Farm and Garden Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Clean up all headlands of weeds and rubbish, and for this purpose nothing equals a good fire. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine, and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—*i.e.*, when about one-third of the plants in the crop are in flower.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, holly-hocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

Orchard Notes for July.

THE COASTAL DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded; good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble

to grade and pack properly, there is only one thing to do, and that is to insist on the observance of standards of quality and see that the fruit offered for sale complies with the standards prescribed and that cases are marked accordingly.

Where the crop has been gathered, the trees may be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree cut away all diseased bark and wood till a healthy growth is met with and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree. When the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer localities a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that may be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees may be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

Land intended for bananas and pineapples may be got ready, and existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for Southern markets may be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from blackheart (the result of a cold winter) or from fruitlet core rot, they are good for canning, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former, and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing, well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before spring growth starts.

In pruning, follow the advice given in the June number; and if you are not thoroughly conversant with the work, get the advice of one or other of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out, it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth, and on spurs; but peaches and nectarines always on wood of the previous season's growth. Once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

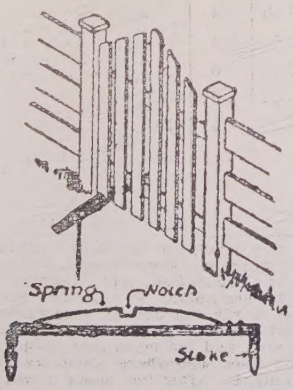
All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees may be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting may be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

SAVING TIME AT THE GATE.

A handy gate latch, which may be worked from either side of the gate with the foot so that a person does not have to set down anything he may be carrying, is shown in the drawing. The latch is made from an old buggy or motor-car spring



which has been heated and bent as shown. It is bolted to a 2 inch by 4 inch with two bolts at one end. Stakes at the ends of the 2 inch by 4 inch hold it in position. By stepping on the spring the gate, which springs either way, may be pushed open.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1924.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6 4	5·48	6·20	5·18	6·37	5·2
2	6·4	5·47	6 21	5·17	6·38	5·2
3	6 5	5·46	6·21	5·16	6 38	5·2
4	6·5	5·45	6 22	5·15	6·39	5 1
5	6 6	5·44	6 22	5·11	6·39	5·1
6	6 6	5·43	6·23	5·13	6·40	5·1
7	6 7	5 42	6 23	5·13	6·40	5 1
8	6 7	5 41	6 24	5·12	6·41	5·1
9	6 8	5·40	6·24	5 12	6·41	5·1
10	6 8	5·39	6 25	5·11	6·41	5·1
11	6 9	5·37	6 26	5 11	6 42	5 1
12	6 9	5·36	6 26	5·10	6·42	5 1
13	6·10	5 35	6 27	5 10	6·42	5 1
14	6·10	5·34	6·27	5 9	6·42	5 2
15	6·11	5 32	6·28	5·8	6·43	5·2
16	6·11	5 31	6·29	5 8	6·43	5·2
17	6 12	5 30	6·29	5·7	6·43	5·2
18	6 12	5·29	6·30	5·7	6·43	5·2
19	6 13	5·28	6·30	5·6	6 44	5 2
20	6·14	5·27	6 31	5·6	6·44	5 2
21	6·14	5 26	6 31	5·5	6 44	5 2
22	6·15	5 25	6·32	5·5	6·44	5 3
23	6·15	5·24	6·32	5·4	6·44	5 3
24	6·16	5 23	6·33	5 4	6·45	5·3
25	6·17	5·22	6·34	5·4	6·45	5·4
26	6·17	5 21	6·34	5·3	6·45	5 4
27	6·18	5·21	6·35	5·3	6 45	5 4
28	6 18	5·20	6 35	5·3	6·45	5·5
29	6·19	5·20	6·36	5·3	6 45	5·5
30	6·20	5·19	6·36	5 2	6·46	5 6
31	...	...	6·37	5·2	...	...

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania, when "Summer" Time is not used.

4	Apr.	●	New Moon	5 17 p.m.
12	,,	☾	First Quarter	9 12 p.m.
20	,,	○	Full Moon	12 10 a.m.
26	,,	☽	Last Quarter	2 28 p.m.

Apogee 9th April, 1·12 a.m.
Perigee 21st April, 6·18 a.m.

On 8th April, between 2 and 3 p.m., the planet Venus will be very near the moon, on its left hand side. The moon will occult it by passing between the earth and the planet before 4 p.m. This should be an interesting spectacle, especially to those who have a telescope or binoculars; even without, the planet should be visible.

On 14th April, the moon will occult Regulus, the brightest star of Leo, between 6 and 7 p.m. The emergence of the planet soon after seven may be observed with binoculars.

The occultation of Uranus on the 29th, about 2 p.m., will be only visible in a telescope.

4	May	●	New Moon	9 0 a.m.
12	,,	☾	First Quarter	12 13 p.m.
19	,,	○	Full Moon	7 52 a.m.
26	,,	☽	Last Quarter	12 16 a.m.

Apogee 6th May, 12·0 noon.
Perigee 19th May, 3·18 p.m.

Regulus will again be occulted by the moon about 3 o'clock in the morning of the 13th of May.

The great astronomical event of May is the transit of Mercury, on the 8th, when the planet passing between the earth and the sun, will cross the sun's face from right to left, but in an upward direction. The commencement of the transit will be at 7·47 a.m. when the planet will reach the lower edge of the sun's disc. It's slow progress will continue until 3·35 p.m. when the sun's opposite limit will be considerably inclined over to the west.

Great care must be taken when attempting to look at the sun that the eyes are protected *very* carefully by *very* dark-coloured or smoked glass.

3	June	●	New Moon	12 33 a.m.
10	,,	☾	First Quarter	11 36 p.m.
17	,,	○	Full Moon	2 41 p.m.
24	,,	☽	Last Quarter	12 16 p.m.

Apogee 2nd June, 3·24 p.m.
Also Apogee 29th June, 9·24 p.m.
Perigee 17th June, 1·6 p.m.

The planet Mercury will be a morning star in June being at its greatest distance, west of the sun, on the 4th.

After Mercury being a morning star, Jupiter will be an evening star, rising, in the early part of the month, somewhere about the time of sunset.

Saturn being in conjunction with the moon on 12th of June, will appear about 2 p.m. on the left of the moon, but somewhat higher during the evening hours.

On 16th June, Mercury will be above the moon, distant about eight times its diameter, about 7 p.m.

On 22nd June, The Solstice, the sun, when having reached its furthest northern point in the sky, appears to stand still before turning southwards.

Saturn, on 30th June, will appear stationary, after which it will appear to be moving again east in its normal direction.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Ooltoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]